IRON & COAL

THE IRON AND COAL TRADES' REVIEW

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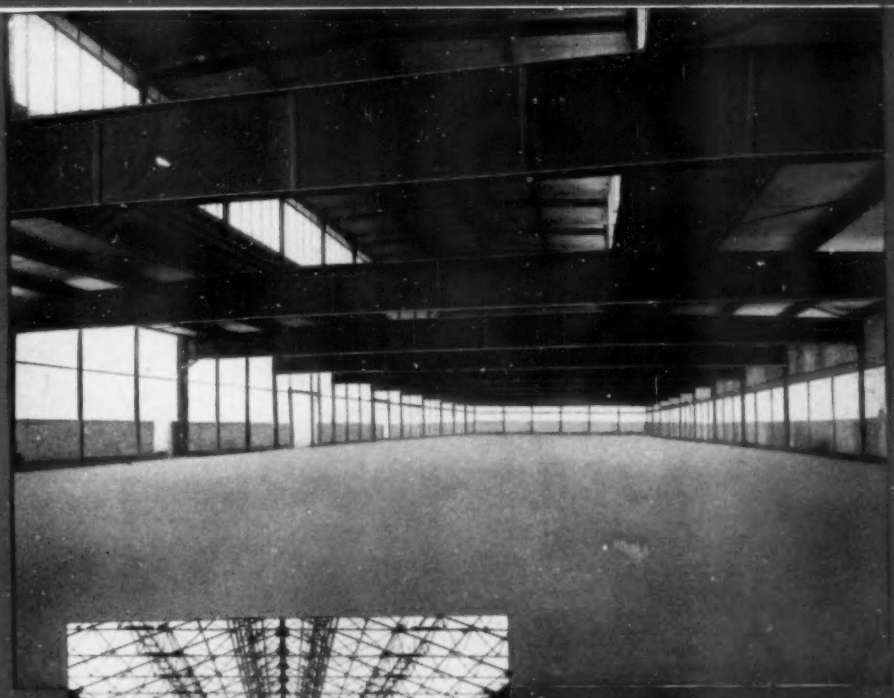
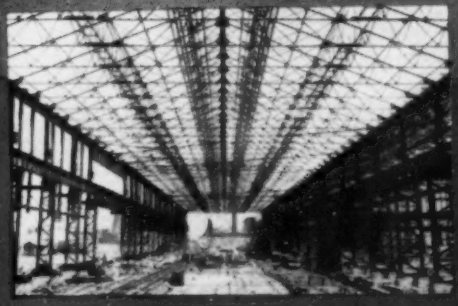




Billet Mill at Durgapur Steelworks, India

400' × 102' Production Shop for English Steel Corporation Ltd., Openshaw, Manchester.

Steelwork for Industrial Buildings

Long and varied experience of the fabrication and erection of heavy structural steelwork contributes to the success with which ARROL handle widely differing contracts. These photographs illustrate this diversity of activities and reflect their high reputation throughout the world.

All types of Steel Framed Buildings; Plated and Opening Structures; Cranes and Mechanical Engineering Works; Dock Gates; Sluices and Floating Caissons; Compressed Air Locks; Hydraulic Machinery; Pipe Lines, Surge Tanks, Sluices and other equipment for Hydro-Electric Projects.

SIR WILLIAM ARROL & CO LTD GLASGOW

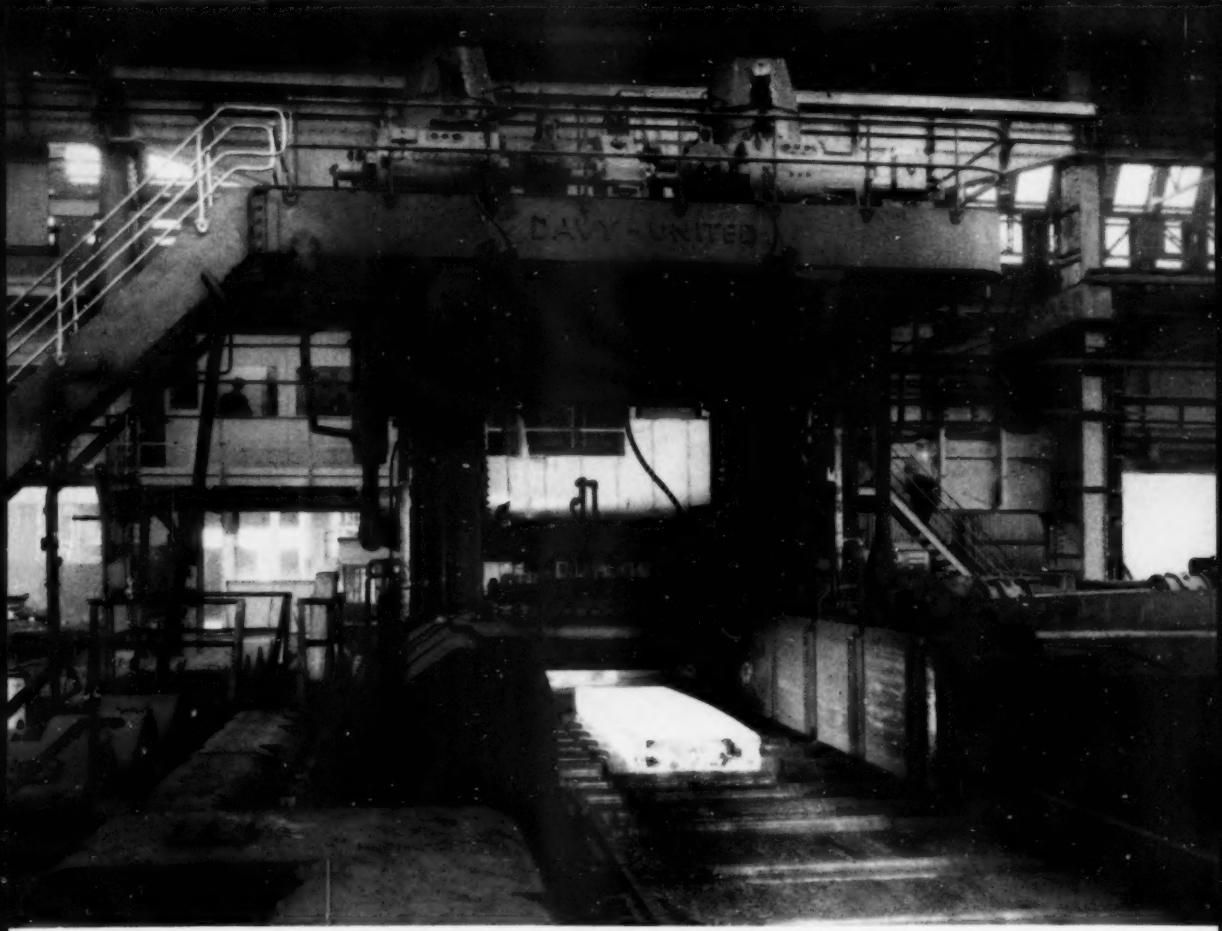
Arrol

DAVY-UNITED

at Appleby-Frodingham

45" x 114" reversing slabbing mill. Photograph by courtesy of Appleby-Frodingham Steel Company (Branch of The United Steel Companies Limited).

386/DU



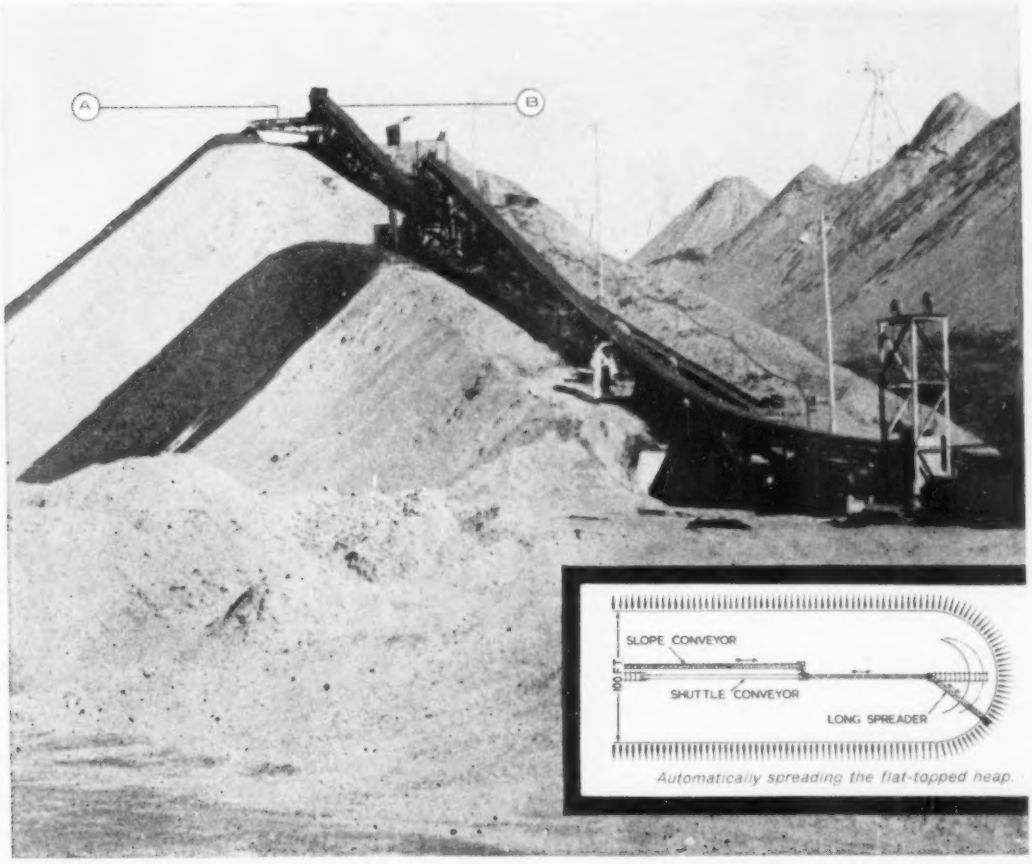
DAVY AND UNITED ENGINEERING COMPANY LIMITED SHEFFIELD

DAVY-ASHMORE GROUP

M&C 'GRASSHOPPER' DUMPS WASTE CHEAPLY AND WELL

With short spreader, the M&C 'grasshopper' builds the spoil-heap from the start. On reaching the required height, the long spreader makes a level top, spreading evenly and automatically, advancing a width of 100 ft. A shuttle conveyor inches forward on rails, so that the conveyor feeding it has only to be extended about every 150 ft. Ask M&C for particulars.

Making a new heap. (A) Short spreader. (B) Shuttle conveyor.



Automatically spreading the flat-topped heap.

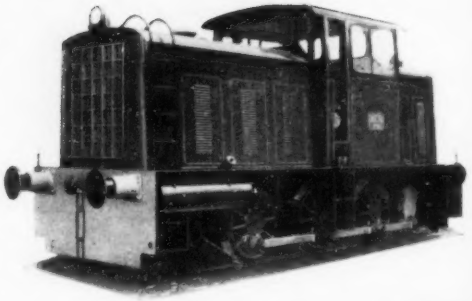
MAVOR & COULSON LTD

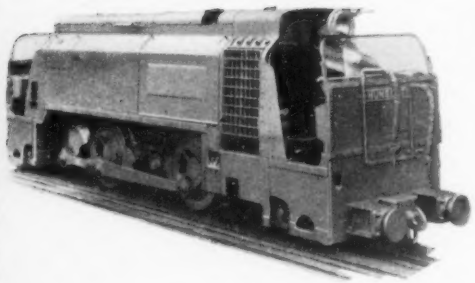
Bridgeton Glasgow S.E. · Olive Grove Road, Sheffield 2
4 Mount Stuart Sq. Cardiff · 1 Eldon Sq. Newcastle-on-Tyne 1

HUNSLET serves the MINING INDUSTRY

SURFACE SHUNTERS

A well-tried range of standard gauge diesel locomotives is available covering from 150 to 750 h.p. Locomotives in this heavy duty range include units with diesel mechanical and diesel hydraulic transmission. Steam locomotives for all purposes including the famous ' Hunslet ' 18" ' Austerity '.



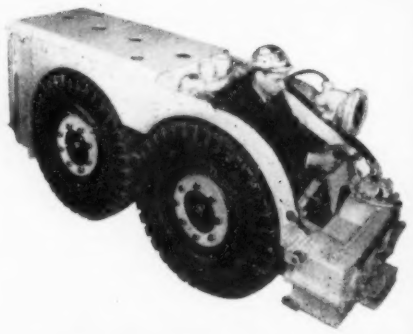


MINES LOCOMOTIVES

The Hunslet flameproof diesel range covers from 23 to 100 h.p. and includes units with single or double-ended driving positions. Electric trolley or battery locomotives with differential drive can also be supplied.

Hunslet have recently introduced two tractors, the MT.25 for underground duties and the ST.125 for surface work. Illustrated is the flameproof MT.25 model which has a hydraulic pump as standard equipment. The basic frame is drilled to receive ancillary equipment, for example:—Angle Dozer, Shovel Loader, Fork Lift, Winch and Trailers, etc.

MINES TRACTORS



THE HUNSLET ENGINE CO. LTD.
ONE OF THE HUNSLET GROUP OF COMPANIES
HUNSLET ENGINE WORKS, LEEDS 10. LONDON OFFICE: LOCOMOTIVE HOUSE, BUCKINGHAM GATE, LONDON S.W.1.

H89

a Q.C.

". . . 'Members of the Jury' I'd begin—and I reckon that would be my lot.

"You want a cool, calculating brain to tackle a job like that. Every step planned in advance—on your toes every minute of the day and heaven help the client if you make a mistake.

"A bit like casting a roll when you come to think of it—except for the talking. Always one move in front of the metal, every detail worked out to a hair-breadth and all the time Charlie, the crane driver, is sitting in his box like a blooming judge.

"As for the Jury? Well, I reckon all of us at AW fill that bill, but speeches won't sway us—it's the **result** that counts here."

CLOSELOY ROLLS – perfection in Roll technique

AW

ARMSTRONG WHITWORTH (METAL INDUSTRIES) LIMITED

Close Works, Gateshead 8, Co. Durham. Tel: Gateshead 71261

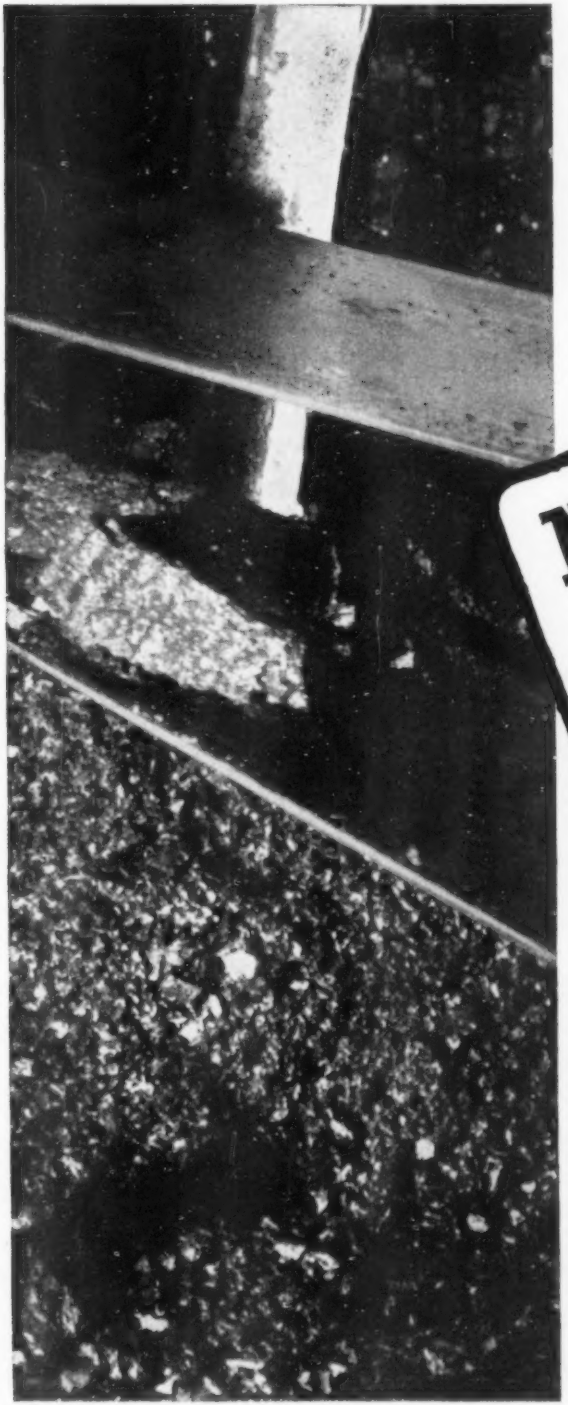
Steel Foundry: Western Road Works, Jarrow, Co. Durham

THE BONSER HYDRAULIC RAM

A HYDRAULIC RAM built to give reliable service under the worst pit conditions. Material and design specifications of the highest standard.
Total Thrust 3·15 Tons at 1000 PSI
Piston 2" Diameter
Tube 3" inside, wall thickness $\frac{1}{4}$"

BONSER TRISTRAM LTD

WATNALL ROAD HUCKNALL NOTTS. Tel: Hucknall 2261



N.C.B. FULL APPROVAL NO. 159

N.C.B. FULL APPROVAL No. 159

Designed to meet the most arduous operating conditions, this Silvertown PREMIUM belting of Cotton/Nylon/PVC construction has now been granted Full Approval No. 159 by the National Coal Board.

This Silvertown belting, as shown in service at a colliery in Northumberland, will ensure increased economies wherever it is installed.

Latest product of Silvertown research and development, Approval No. 159 belting gives...

** greater tensile strength * improved impact resistance * reduced weight * increased flexibility * better troughing * improved tear resistance * better fastener anchorage * permits smaller drums.*

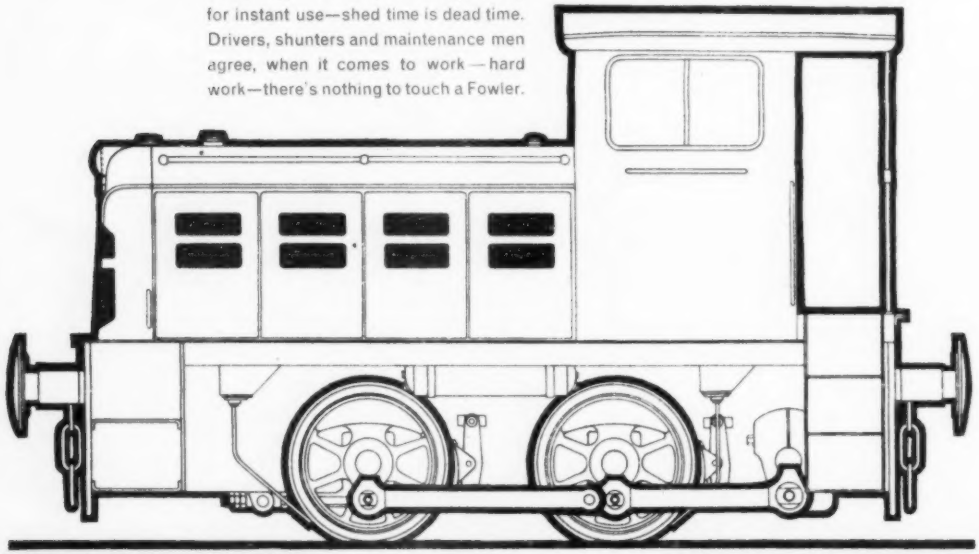
Silvertown

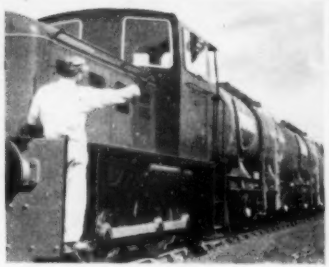
SILVERTOWN RUBBER CO. LTD.
Herga House, Vincent Square, London S.W.1
1/3477

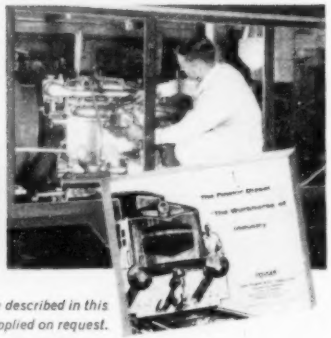
FOWLER

MEANS FASTER HANDLING

Everything about a Fowler diesel shunter spells functional efficiency. With finger-tip control and all-round visibility it's simple, and non-tiring to drive. Maintenance requirements are even simpler, that's why this diesel is always ready for instant use—shed time is dead time. Drivers, shunters and maintenance men agree, when it comes to work—hard work—there's nothing to touch a Fowler.



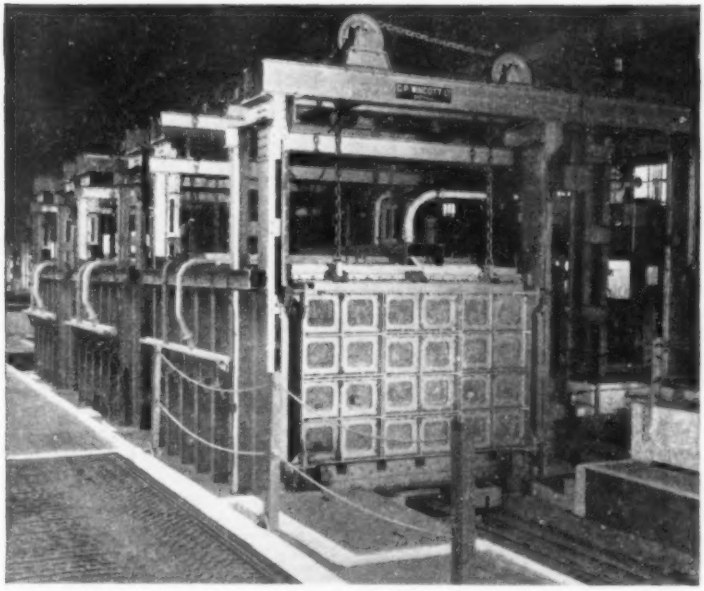




There is a wide range of Fowler diesels fully described in this new technical leaflet, gladly supplied on request.

JOHN FOWLER & COMPANY (LEEDS) LTD, LEEDS 10. TEL: 30731

Cut fuel and labour costs in your **Steel Foundry** and achieve continuity of production by installing a **Triple Chamber Quenching Furnace**



By permission of Messrs. Edgar Allen & Co. Ltd.

The three separate chambers of this City Gas Fired Furnace are 12′ 0″ long × 10′ 0″ in effective width. They are each equipped with two electrically operated self-locking doors and operate as independent units.

The castings are preheated from cold to 300°C. in the first chamber and then pass to the second chamber where they are raised to 750°C. They are finally heated to 1100°C. in the third chamber and after soaking are quickly withdrawn by an extractor gear and conveyed to the oil or water tanks for quenching. The chambers are equipped with instruments for the automatic control of temperature, air/gas ratio and pressure. Prescribed heating curves can easily be maintained.

By utilising the third chamber as a cooling chamber the furnace can be employed for annealing purposes. When desired the first and third chambers can be independently used for the batch treatment of castings.

WINCOTT FURNACES

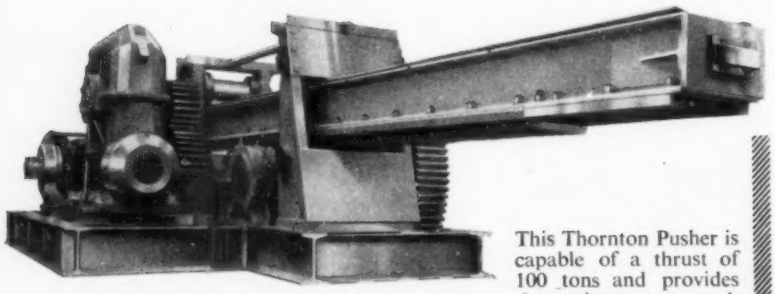
G.P. WINCOTT LIMITED SHEFFIELD, ENGLAND

Telegrams: WINCOTT, SHEFFIELD. Telephone: 20211/2

THORNTON

ANOTHER

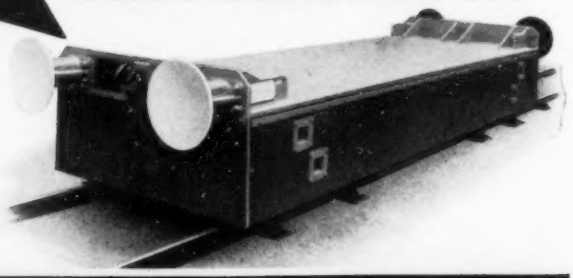
100 TON FURNACE PUSHER...



This Thornton Pusher is capable of a thrust of 100 tons and provides the motive power to push a continuous train of ingot or slab furnace cars through the furnace.

60 TON CAPACITY CAR FOR SHOT BLASTING...

We designed this car with all-round rubber screening to provide added protection when bearing heavy castings for cleaning in a shot-blast chamber.

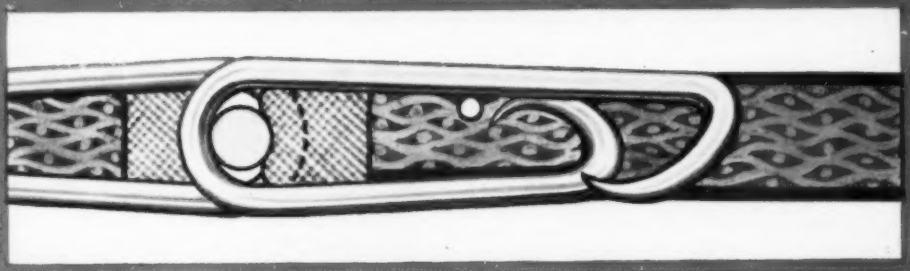


Specify THORNTON Equipment

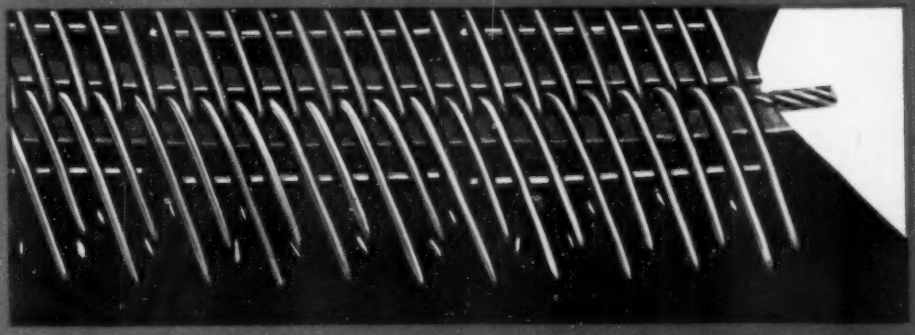
Built to our own designs or to customers specification

B. THORNTON LTD. TURNBRIDGE, HUDDERSFIELD. Tel 7541

ONLY COMET FASTENERS



with the **Wedge action Clench**



give **Increased joint strength**

The profile of Comet's ground point, its smoothness and final plating ensure clean penetration with least disturbance of belt fabric....angle of entry and Comet's special wedge-action clench add greater strength to the joint.

On test, on the face, a Comet joint is stronger....longer.

Comet

COLLIERY CONVEYOR BELT LACING SYSTEM

MASTABAR MINING EQUIPMENT CO. LTD.

AVENUE PARADE · ACCRINGTON · LANCASHIRE · TELEPHONE: 35411 (3 LINES)

SALES & SERVICE DEPOTS: CARDIFF · LONDON · NOTTINGHAM · LEEDS · ACCRINGTON · NEWCASTLE-UPON-TYNE

1A

MAERZ

100 TON ALL BASIC
OIL FIRED OPEN HEARTH FURNACE

Installed at The Albion Steel Works of
The Briton Ferry Steel Co. Ltd.
This O.H. Furnace is providing consistently
high outputs on cold charged material
with excellent overall economy.

Priest Furnaces Ltd.

Sole representatives in Britain for **MAERZ** *open hearth furnaces*

F152

With the Hanmade Anti-breakage Storage Bunker haulage breakdowns, derailment or shaft hold-ups need not stop production. Normally coal can proceed 'straight through" but in the case of bottle necks out-bye of the bunker, production can be turned into the Bunker and unloaded later in the shift. Advantages?
Greater flexibility of output, less coal degradation and increased production.

Requires only one man to operate.

Developed in conjunction with the Mechanization Dept. of Area 1 East Midlands Division of the National Coal Board.

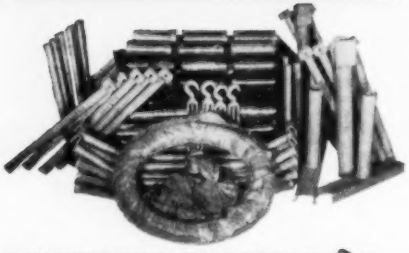
hanmade anti-breakage storage bunker

HANMADE CONVEYOR CO. LTD., WINIFRED STREET, HUCKNALL NOTTS. Telephone 3448/9

(above and left) Fed by a gathering arm loader, this 30" rope belt conveyor at Calverton Colliery is loading out stone.

DISTINGTON

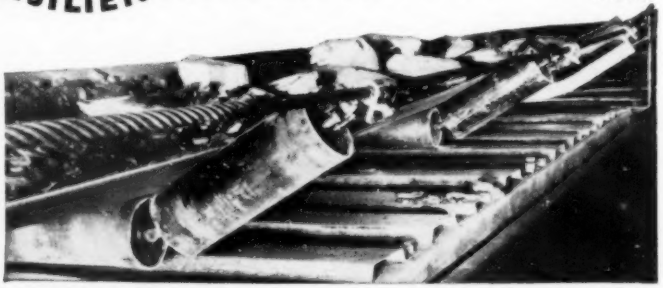
This easy-to-install conveyor structure gives resilient support to the load; this reduces spillage and prolongs belt life. Dust-collecting surfaces are negligible. Throughout the world, mines are turning to rope belt structure because of the savings that it offers in belt costs and manpower.



Complete set of components for 200' of rope belt conveyor structure stocked in an area of 28 sq. ft. Considerable cost saving is achieved through absence of storage or transport problems underground.

DISTINGTON-GOODMAN RESILIENT ROPE BELT CONVEYOR STRUCTURE

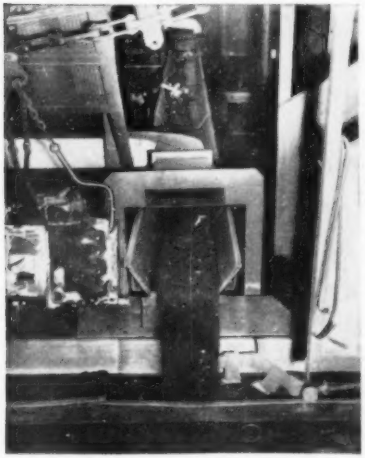
PATENTED



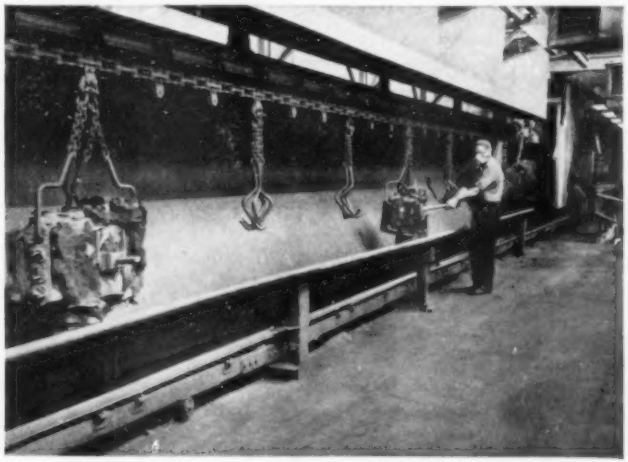
(right) Ropebelt Structure showing the increased wing angle of the idler assemblies under load. The steel framework of a drive section in the background is not part of the standard belt structure.

DISTINGTON ENGINEERING COMPANY LIMITED WORKINGTON CUMBERLAND ENGLAND

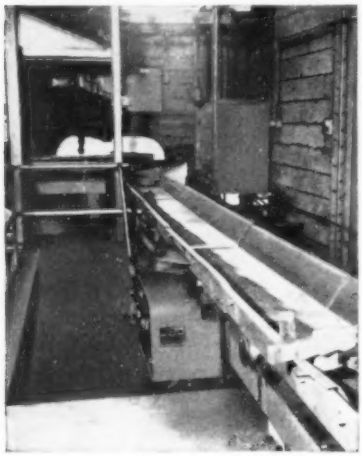
BC10



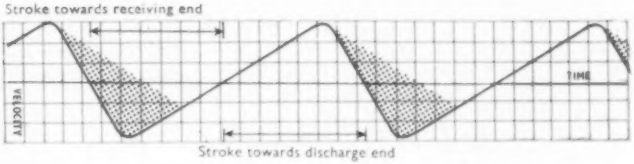
Shaker conveyor discharging scrap on to a similar conveyor. (The photographs reproduced in this advertisement are published by courtesy of Ford Motor Company Limited.)



Sand cores and risers from engine component castings fall on to a shaker conveyor which carries them to a rotary scrap breaker and sand separator.



Shaker conveyor showing type G 20 drive, driven by a 30 h.p. flywheel motor; this robust drive delivers high peaks of energy.



SHAKER CONVEYING

in a mechanised foundry

The Distington-Goodman shaker conveyor is not a jigger conveyor. Its troughs move in only one plane on ball-bearing rollers and propel material by variations in their rates of acceleration and deceleration (these are shown in the time-velocity curve above: the shaded areas represent the movement of material independent from the movement of the troughs).

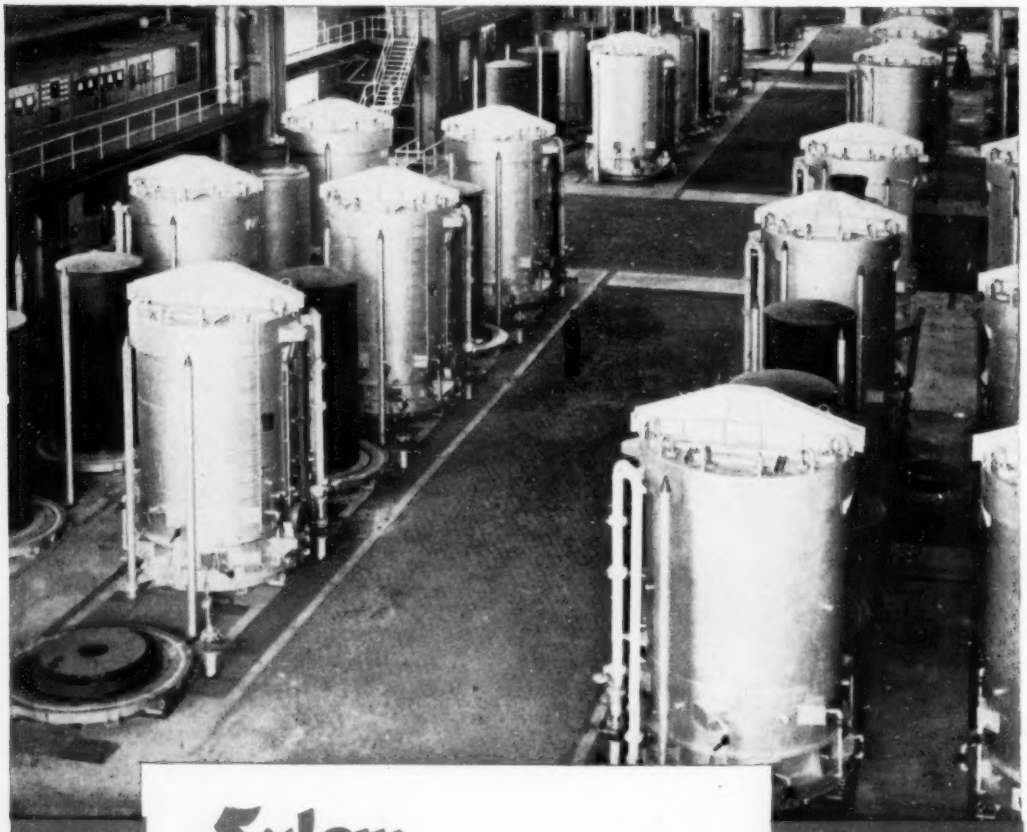
Distington-Goodman shaker conveyors have been used for many years for loading and conveying coal and rock. Their robust all-steel construction makes them ideal for handling hot materials in foundries and cement clinker and sinter.

They are easily extended and contracted and can be made self-loading from stock heaps. Lines of troughing can be made to deviate through angles up to 90°. Conveying capacity depends upon several factors but would normally exceed 60 t.p.h. on the level.

DISTINGTON ENGINEERING COMPANY LIMITED

WORKINGTON · CUMBERLAND · ENGLAND

DB.22



Salem for many years builders of modern multi-stack coil annealing plants now offer in collaboration with Messrs. Matthias Ludwig of Essen, the most up-to-date single stack coil annealing plants for both sheet and tin plate. More than 300 furnaces installed during the last 10 years.

Salem design, build and put into operation complete plant with all ancillaries.

Salem — BROSIUS

MATTHIAS LUDWIG ESSEN
INDUSTRIEOFENBAU

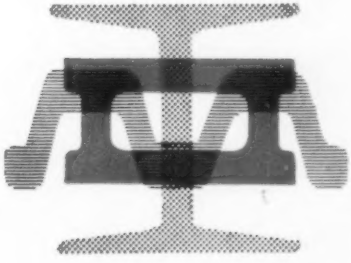
SALEM-BROSIUS (ENGLAND) LIMITED • MILFORD HOUSE • MILFORD • Nr. DERBY • Phone: Duffield 2271 • Grams: Enamor "Derby"

P.5072

GROETSCHEL
K. 45 Roof Bar

This Bar in an entirely new section, is made of the same special alloy steel as other Groetschel roof bars. It is supplied in plain lengths or link form and can be used for face or roadway support. It is ideally suited for slide bar and stagger bar systems. It's advantages include great strength for a comparatively shallow section and suitability for thin seam work.

These bars can be supplied with fixed prop locations and in sections up to 15 ft. long. The Groetschel K. 45 Section is twice as strong as W. Section in vertical bending for comparable weight and is also as strong in vertical bending as 3½" x 3½" H. Section.



BECORIT (G.B.) LTD. 2 Leslie Road, Gregory Boulevard, Nottingham · Telephone: 72207/8
BECORIT (S.W.) LTD., 29 High Street, Cardiff, Wales · Telephone: 25492
BECORIT (G.B.) LTD., 42 Frederick Street, Edinburgh 2 · Scotland · Tel: Caledonian 5432
Messrs. E. WHEATLEY LTD., 13 Rockingham Street, Sheffield · 1 · Telephone: 25774

10 years ago

The first Cable Belt rope driven conveyor was installed

. . . a recent installation is to the best of our knowledge

THE LONGEST BELT CONVEYOR IN THE WORLD with one driving unit.

Installed at Coal Cliff Colliery in New South Wales Australia this conveyor is almost

2½ MILES LONG!

distance no object with

CABLE BELT ROPE DRIVEN **CONVEYORS**

CABLE BELT ROPE DRIVEN CONVEYORS REGISTERED TRADE MARK

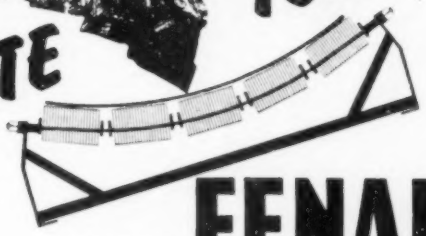
CABLE BELT LTD. LONGMAN INDUSTRIAL ESTATE, INVERNESS, SCOTLAND

Telephone: Inverness 2761-2 Telegrams: Cablebelt, Inverness

Agents in: AUSTRALIA; BENELUX COUNTRIES; CANADA; FINLAND; FRANCE; GERMANY; INDIA; JAPAN; NORWAY; SINGAPORE & MALAYA; SOUTH AFRICA; SPAIN; SWEDEN; U. S. A.

G

ELIMINATE TORN BELTS!



WITH **FENAPLAST**

DIAMOND TYPE CONVEYOR BELTING

YOU CAN BE SURE THAT FENAPLAST DIAMOND BELTING DOES REDUCE BELT COSTS, BECAUSE:

- All-nylon carcass eliminates any possibility of tearing;
- Complete plastic impregnation makes it impervious to water;
- Solid woven, there are no problems of ply separation.

SPECIFY FENAPLAST DIAMOND TYPE AND BE SURE

RANGE OF DIAMOND TYPE BELTINGS AVAILABLE				
N.C.B. APPROVAL NO.	158	149	158	149
TYPE	DIAMOND	DOUBLE DIAMOND	HEAVY DIAMOND	EXTRA HEAVY DIAMOND
BREAKING LOAD MINIMUM PER INCH WIDTH	2000 LB	2500 LB	3000 LB	4000 LB
THICKNESS	8 mm	8 mm	8 mm	9 mm

J. H. FENNER & CO. LTD. HULL

LARGEST MAKERS OF V-BELT DRIVES IN THE COMMONWEALTH

THESE THINGS DON'T HAPPEN

IF YOU KNOW THE ROPES

These photographs show some typical instances of damage to ropes and associated equipment caused by mishandling, wrong fitting or neglect. In each case serious damage was caused to the Wire Rope and considerable expense was involved in replacement and loss of output.

"*Give your Ropes a Chance*" by reading the Martin-Black series of leaflets which contain much useful and interesting information. We will be pleased to send your copy/copies on request.

MARTIN BLACK

WIRE ROPES

MARTIN, BLACK & CO. (WIRE ROPES) LTD., SPEEDWELL WORKS, COATBRIDGE, NEAR GLASGOW
Telephone : COATBRIDGE 567 (PBX)

London: " Number Twentyfive " Curtain Road, E.C.2. — *Telephone*: BISHOPSGATE 6667/8/9
Liverpool: 31 N. John Street, 2. — *Telephone*: CENTRAL 0924 (2 lines)
Nottingham: 640 Woodborough Road, Mapperley. — *Telephone*: NOTTINGHAM 64397, 66055/6
Newcastle-on-Tyne: 13 Sandhill Quayside. — *Telephone*: NEWCASTLE 2-1282
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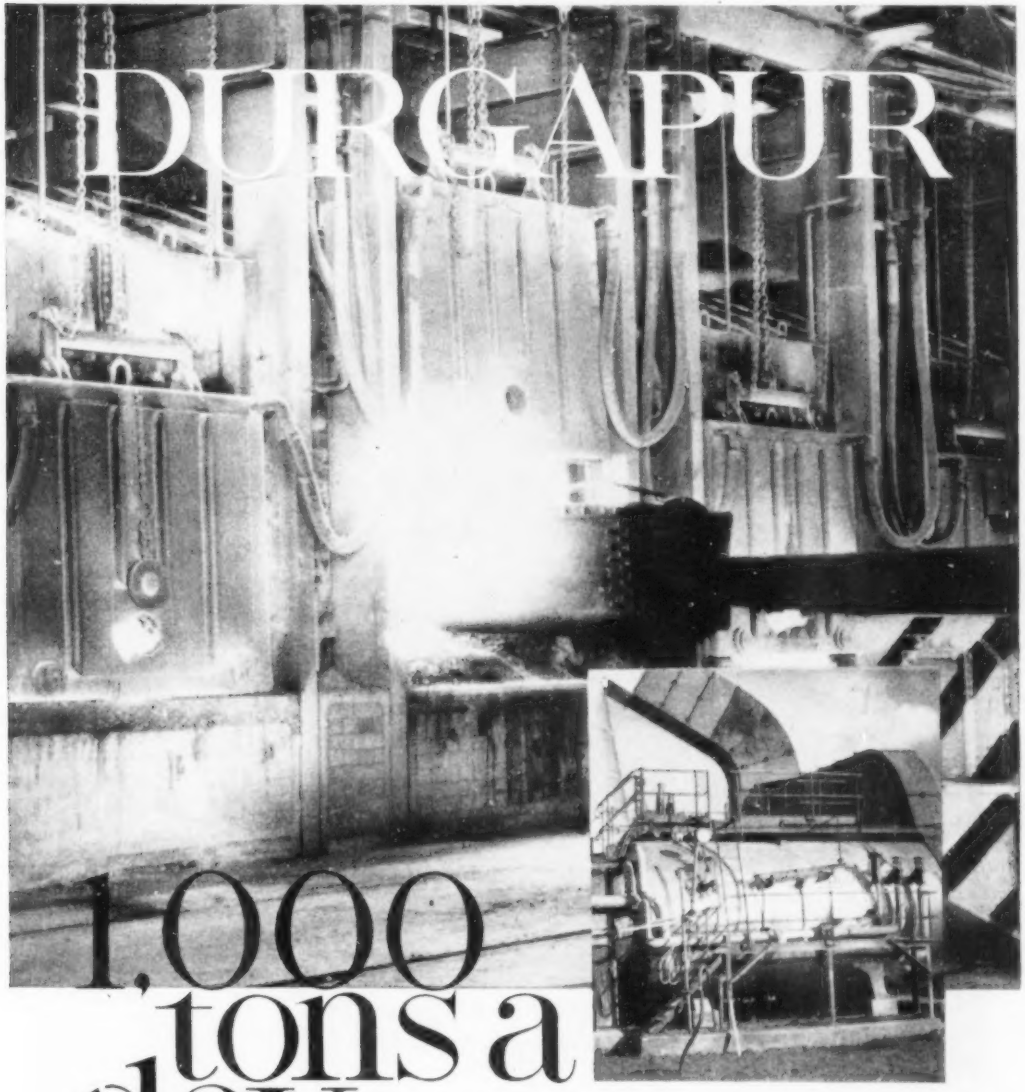
STOCKS AND SPLICING FACILITIES AT LONDON, LIVERPOOL AND NOTTINGHAM



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but not only of steel. This is also the amount of steam generated by S-B-C waste heat boilers at Durgapur. The Spencer Bonecourt boiler shown above, inset, and six others like it, produces from 10,000 to 20,000 lbs of steam per hour—at 200 lbs per sq. in. S-B-C waste heat boilers were chosen by The Wellman Smith Owen Engineering Corporation Ltd., to operate in conjunction with their 200 ton open hearth melting furnaces for Indian Steelworks Construction Co. Ltd.

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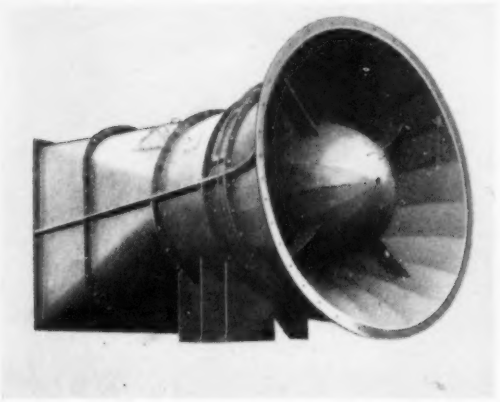
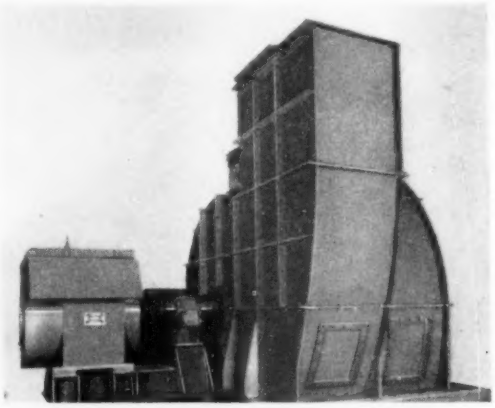


Axial Flow



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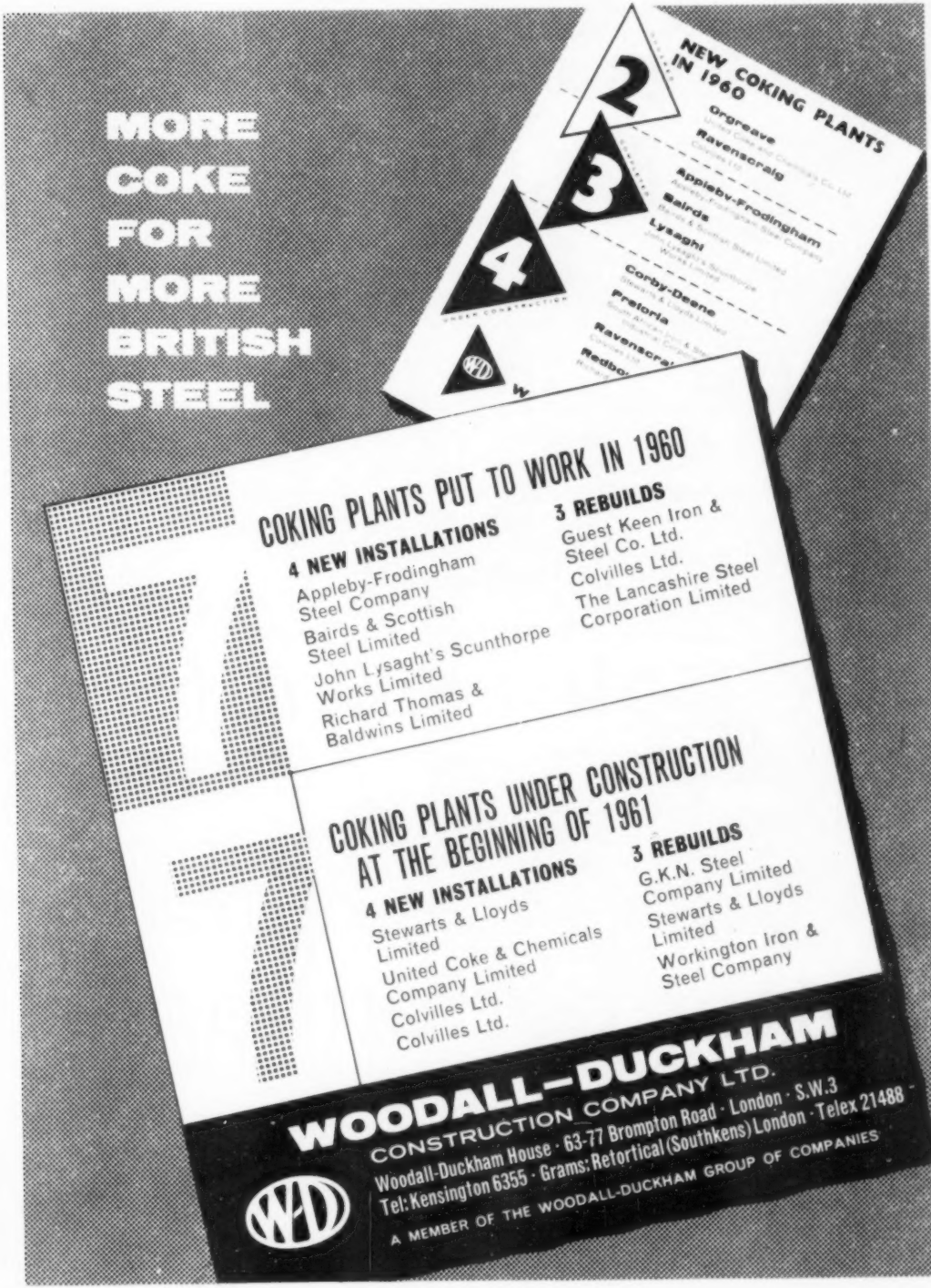
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3
4
14
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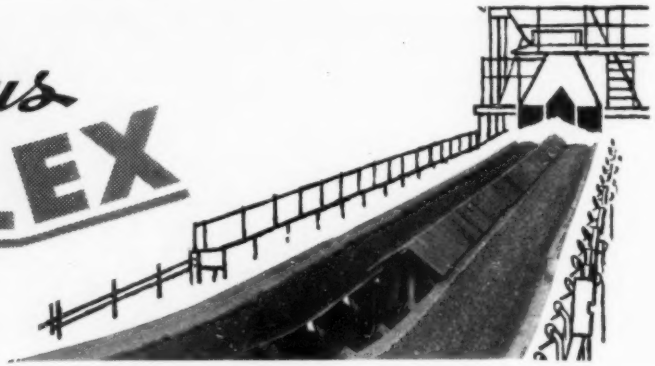
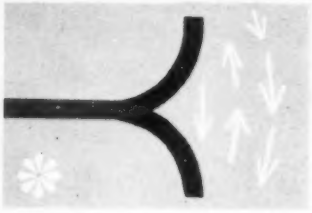


.. the belt with the

Careful analysis of causes of failure in conventional belts has led to the development of Gaflex—the nylon wefted conveyor belt with five improved characteristics.



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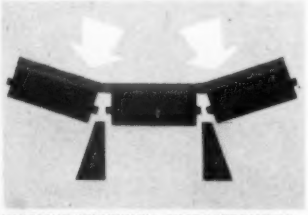

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NOW 1¼m.! (JAN. '61)
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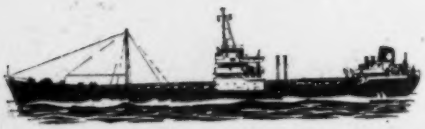

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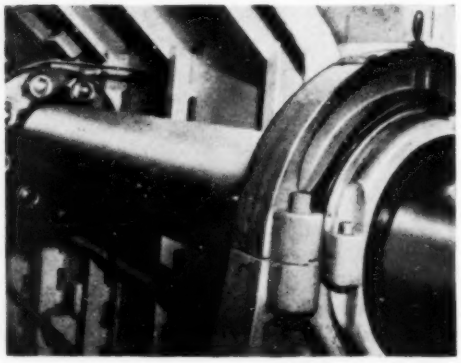

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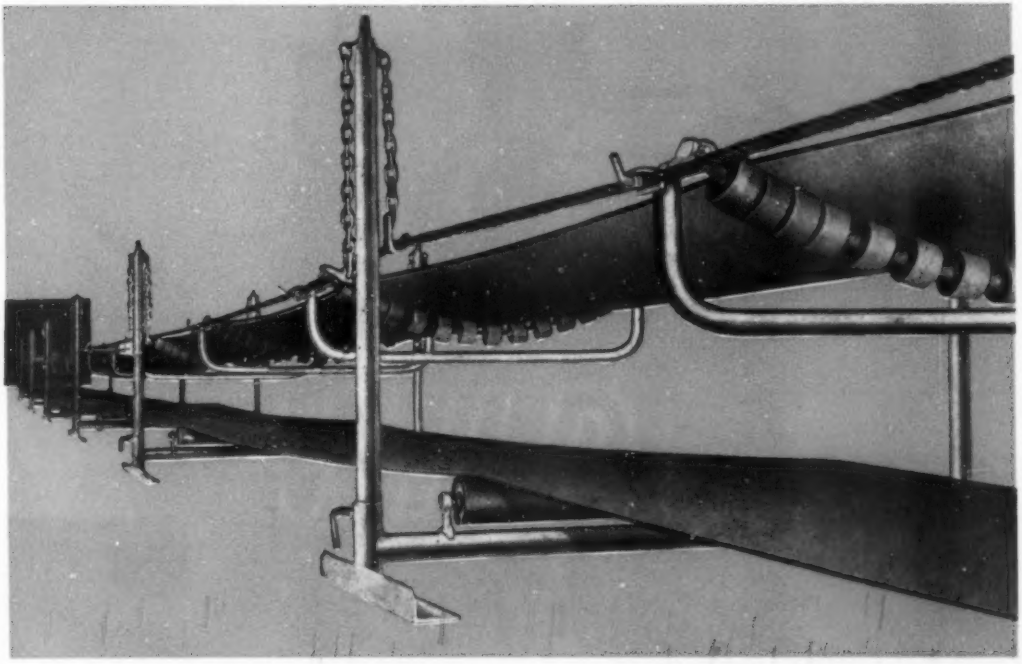

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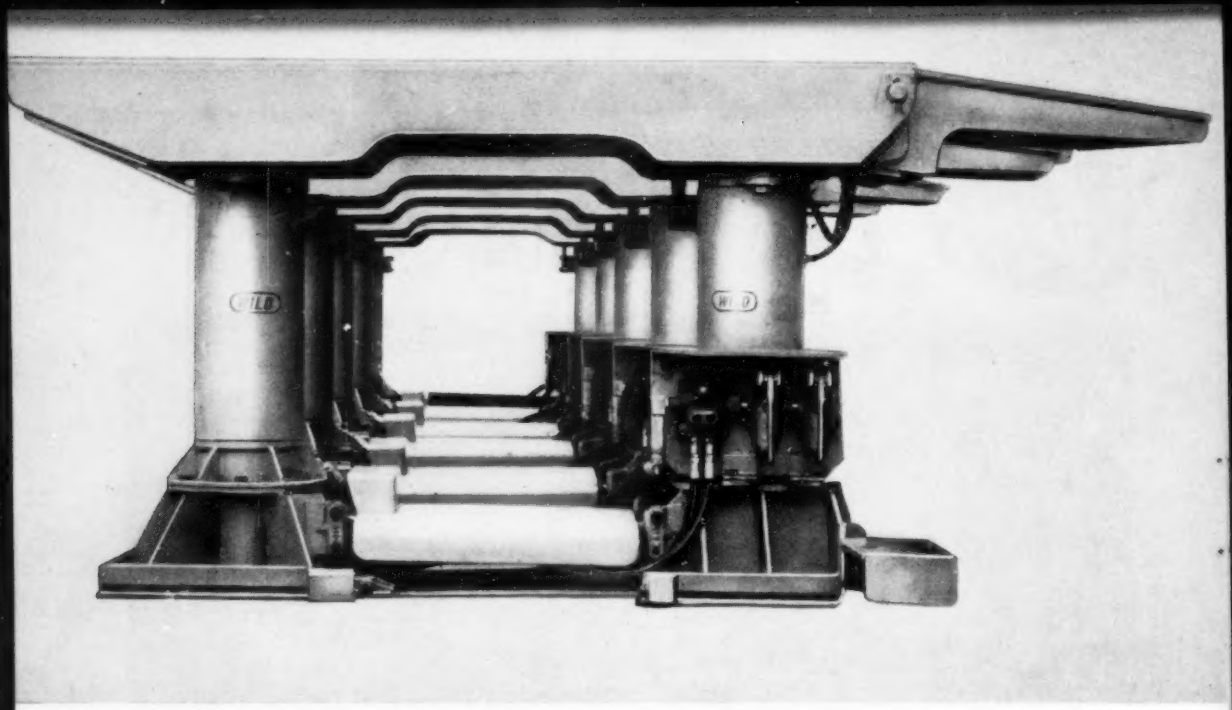
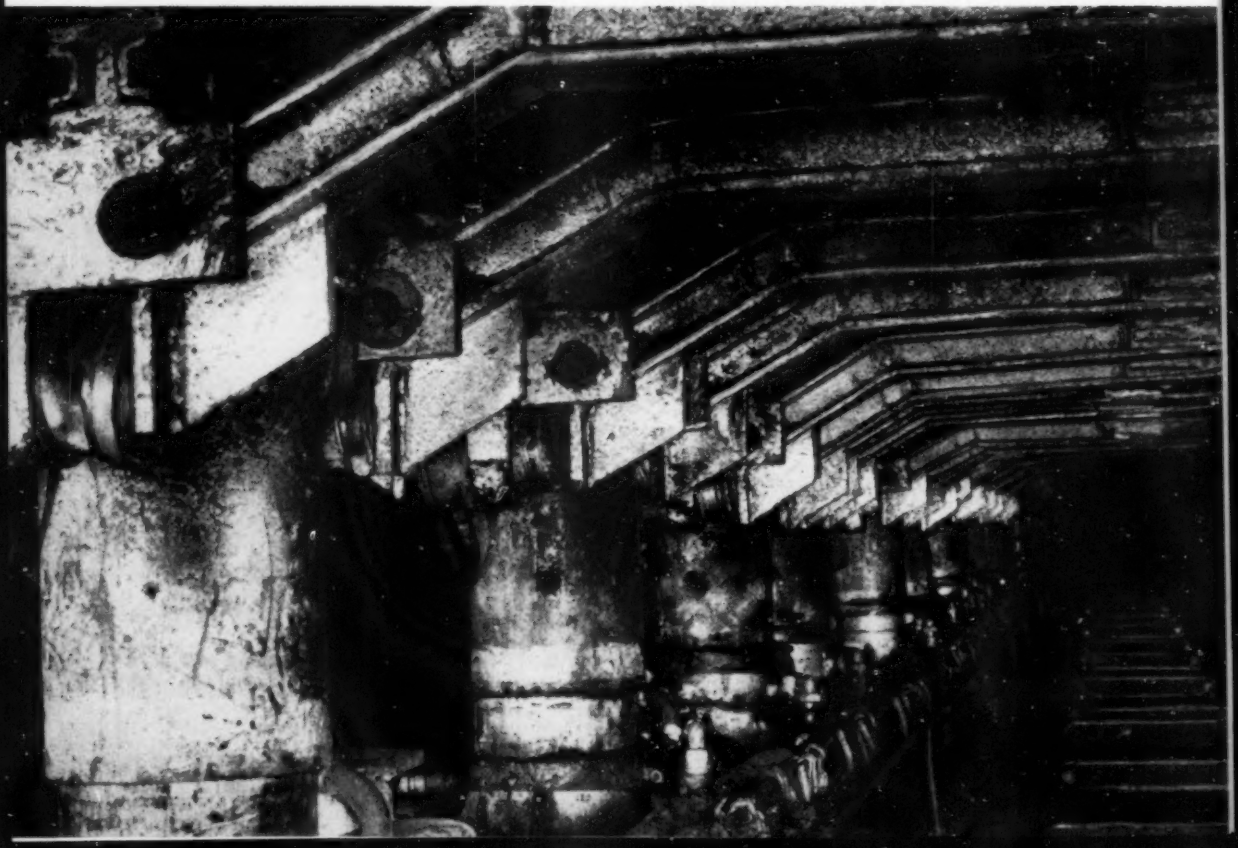


Above:

Goal Post type powered support system, before installation at the face. WILD double-acting rams actuate the units.

Below:

An installation of Gull Wing type powered supports.



SUPPORT SYSTEM

BY WILD

Top: 50 ton thin seam Desford Chock.
Centre: 100 ton Desford Chock with pedestal.
Bottom: 100 ton Desford Chock with ratchet extension and ram.

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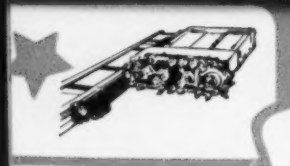

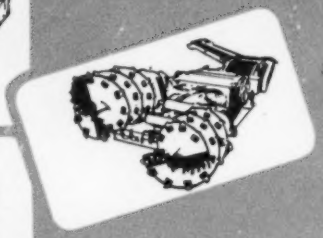

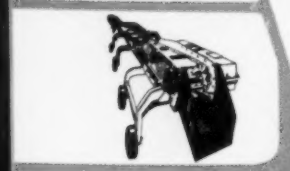

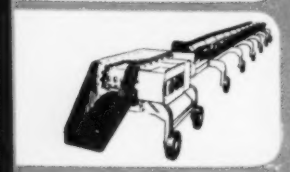

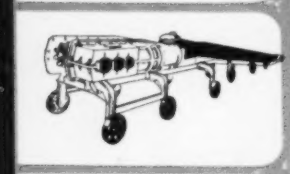

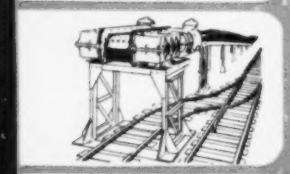

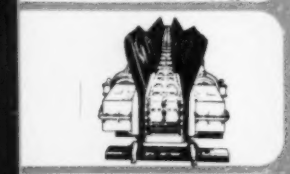

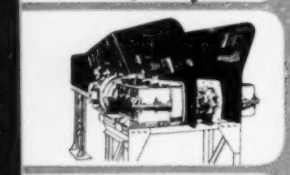

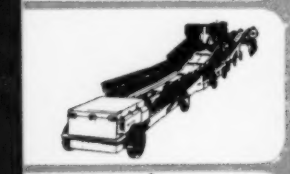

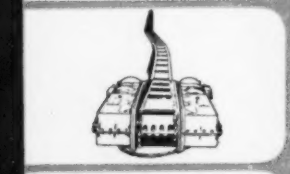

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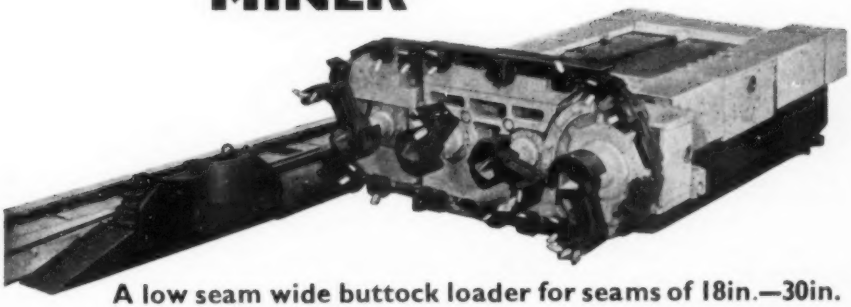
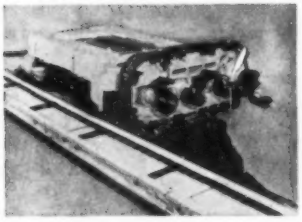
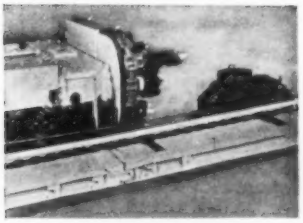


A low seam wide buttock loader for seams of 18in.—30in.

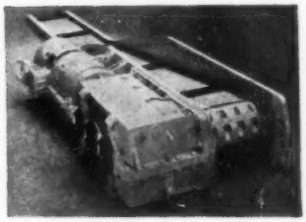


The machine as illustrated is single ended and has four boring arms spaced at approximately 72° lag to each other. These operate ahead of the periphery chain which clears any uncut and unloaded coal. The chain includes flight pick boxes specially designed to ensure complete loading of coal.



An efficient water jet dust suppression system is an integral feature of the machine.

Outputs equivalent to 200 tons/shift in seam height of 2ft. 6in. have been achieved, with considerable improvement in output per man shift.



The illustrations on either side show the C5 Lo-hite conveyor currently in use with the Midget Miner

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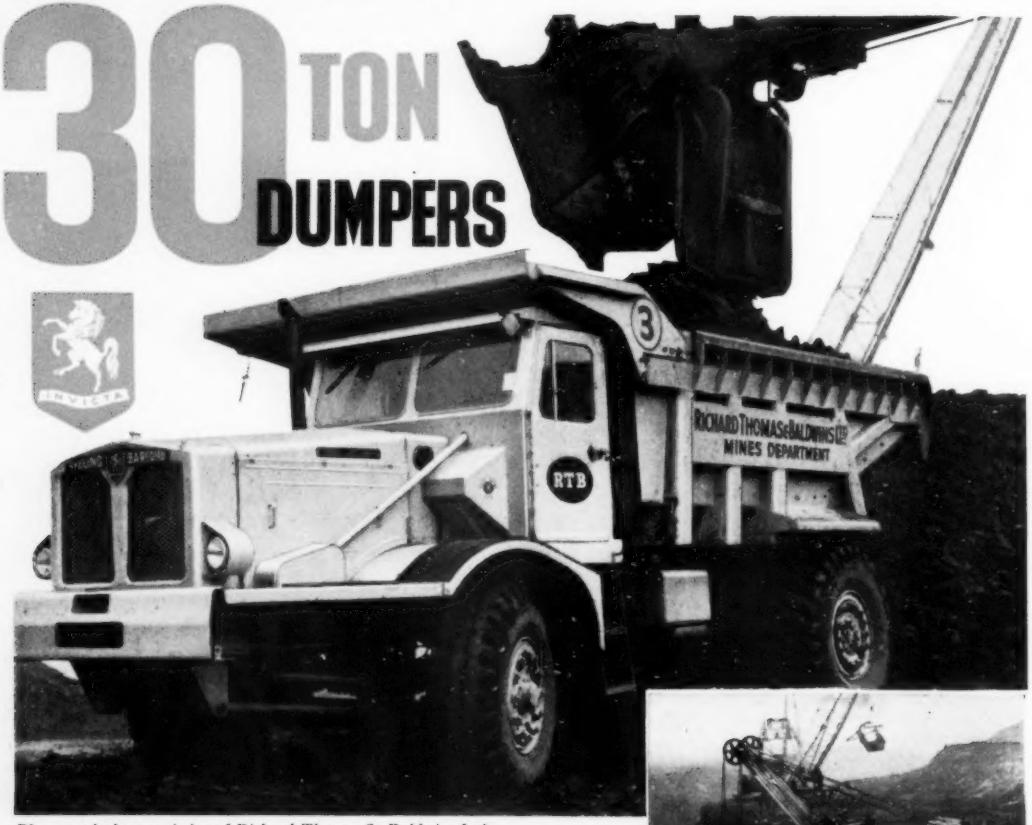
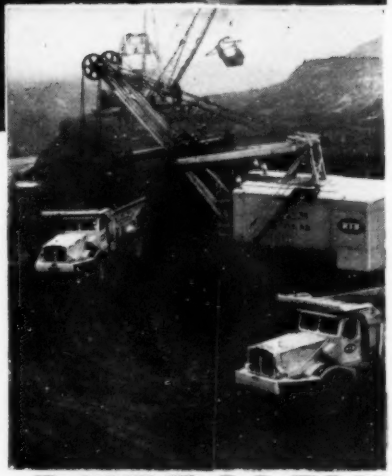
30 TON DUMPERS



Photographs by permission of Richard Thomas & Baldwins Ltd.



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¼ ton Mobile Forging Manipulator specially designed for Small Forges

Fast in Operation. Turns about on its own wheel base. Ensures accurate placing of the billet during forging. Maintains a truly parallel adjustment of the height of the bar during forging. Rotation of the grip head can be stopped accurately in any desired position. Recoils from the forging blow without oscillation thus providing a steady action—essential when forging to close limits. Permits a good view of the workpiece to the driver. Easy access to all parts facilitates maintenance.

Please write for illustrated brochure to:—

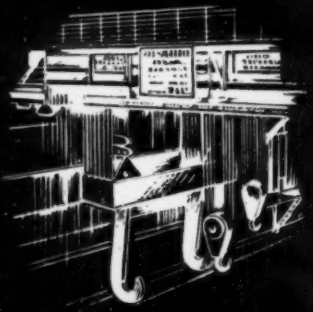
THE WELLMAN SMITH OWEN ENGINEERING CORP. LTD.

PARNELL HOUSE, WILTON ROAD, LONDON, S.W.1 WORKS: DARLASTON, South Staffs, BELFAST

INCREASES OUTPUT • REDUCES COSTS • SAVES SPACE

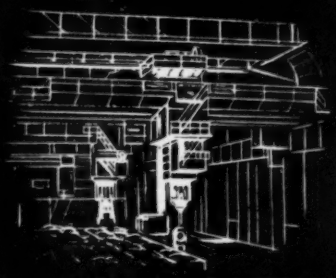
ELIMINATES ARDUOUS LABOUR • MINIMISES DANGEROUS ACCIDENTS

STEELWORKS EQUIPMENT

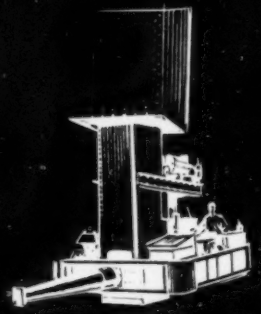


Ladle Cranes

Soaking Pit Cranes



Stripping Cranes



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. . . designed to meet your special needs

Vibratory Screens for every purpose, of robust construction, in Single, Double, Three or Four-Deck types.

The above photograph, which is reproduced by permission of the N.C.B., illustrates a Portable Coke Screening Plant in use at the N.C.B. for dealing with 80/100 tons per hour of coke from a stock pile. The vibratory screen shown is one of our 12 ft. x 5 ft. two-deck types.

CRUSHING, SCREENING and ENGINEERING LIMITED

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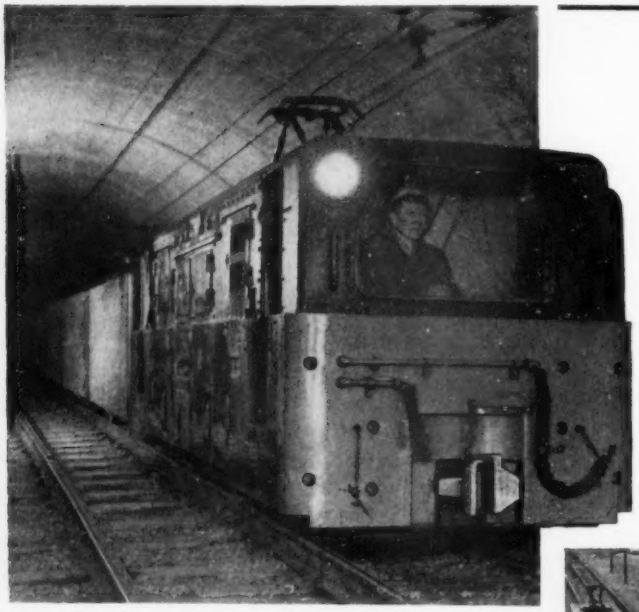
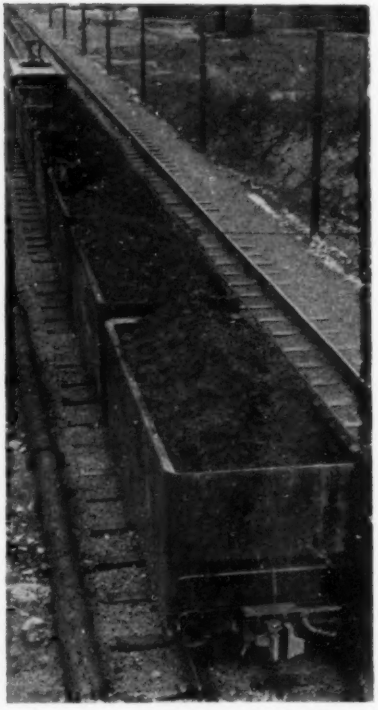


Why are ESC Willison Automatic Couplers used in Iron Ore Mines?



For exactly the same reasons that they are also used in Coal mines, Steelworks and Hydro-electric tunnelling.

- They couple automatically when buffed together. This ensures safety to haulage personnel by eliminating the necessity for going between cars.
- They can be "lock-set" to permit buffing without coupling.
- Rotary tippling of cars without uncoupling can be arranged.
- The angle of mated couplers on curves is limited only by the design of the car.
- Derailment troubles are decreased because "Willison" couplers always tend to hold the cars on the track.
- Reduced costs of transportation are obtained through increased speed in car handling.

ENGLISH STEEL
CASTINGS CORPORATION LTD.
River Don Works, Sheffield

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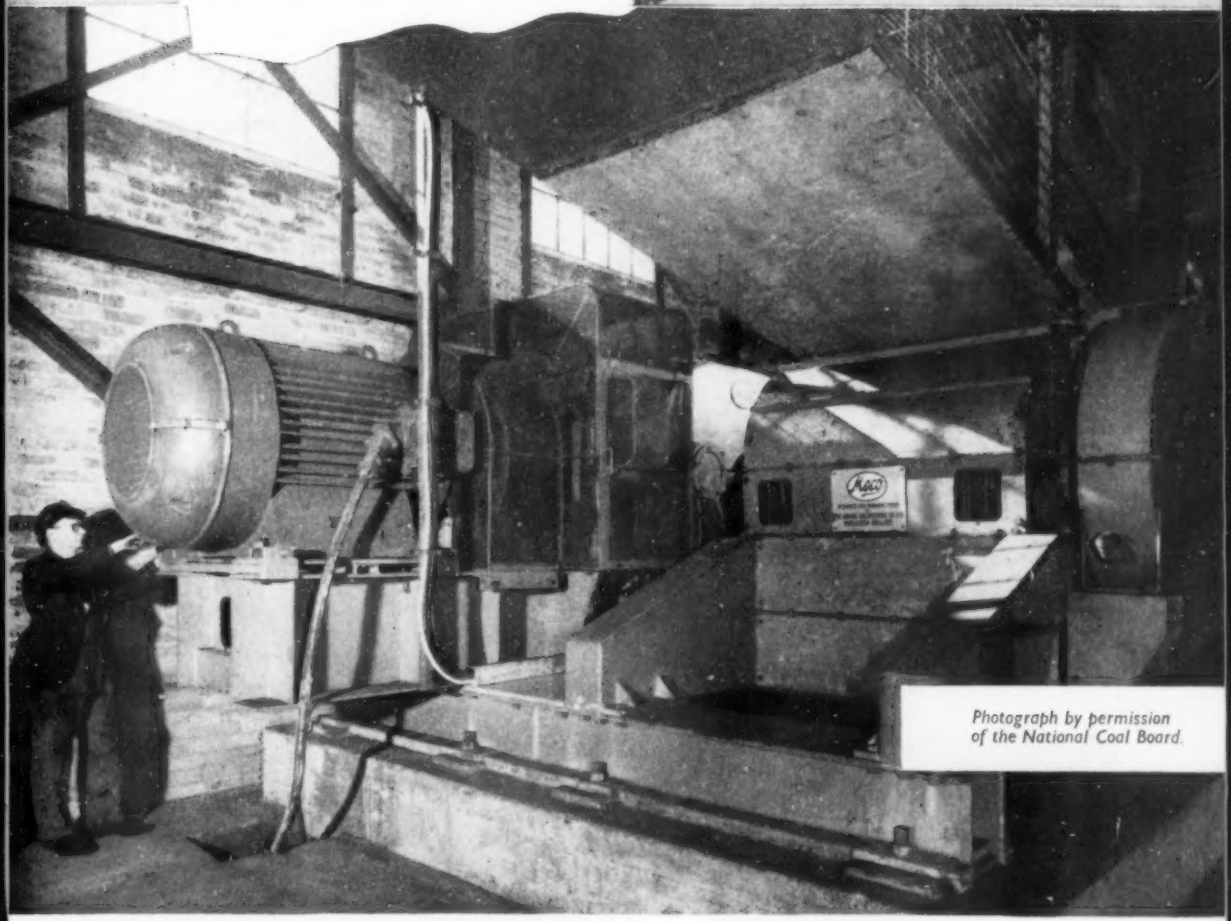
Meco

MAXIMUM ECONOMY IN DRIFT TRANSPORT

The illustration shows a Meco single power pack coupled to a double drum belt conveyor driving head. The conveyor is 2,146 ft. long with a lift of 478 ft. and carries over 2,000 tons day run-of-mine coal. The H.P. rating with the single power pack is 300 at 400 ft./min. MECO STANDARD POWER PACKS, SINGLY OR IN COMBINATION, CAN BE BUILT UP TO THE MAXIMUM POWER OF ANY AVAILABLE HIGH DUTY CONVEYOR BELTING.



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MECO WORKS, WORCESTER, ENGLAND.

Telephone: Worcester 22291 (7 lines).
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LINDLEY

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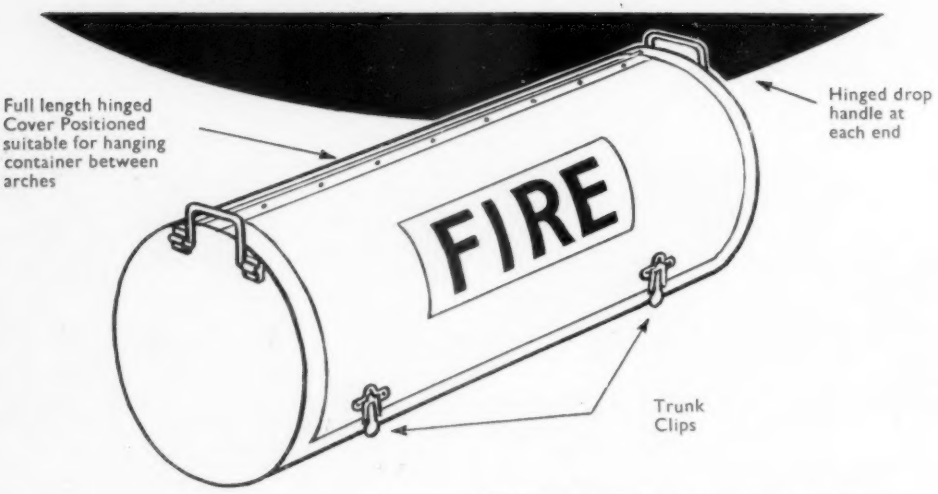
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Hinged drop handle at each end
FIRE
Trunk Clips

To hold 5 lengths of Hose and Fittings
Finished Painted Red

TYPE 40 CABINET . . .

to meet current regulations

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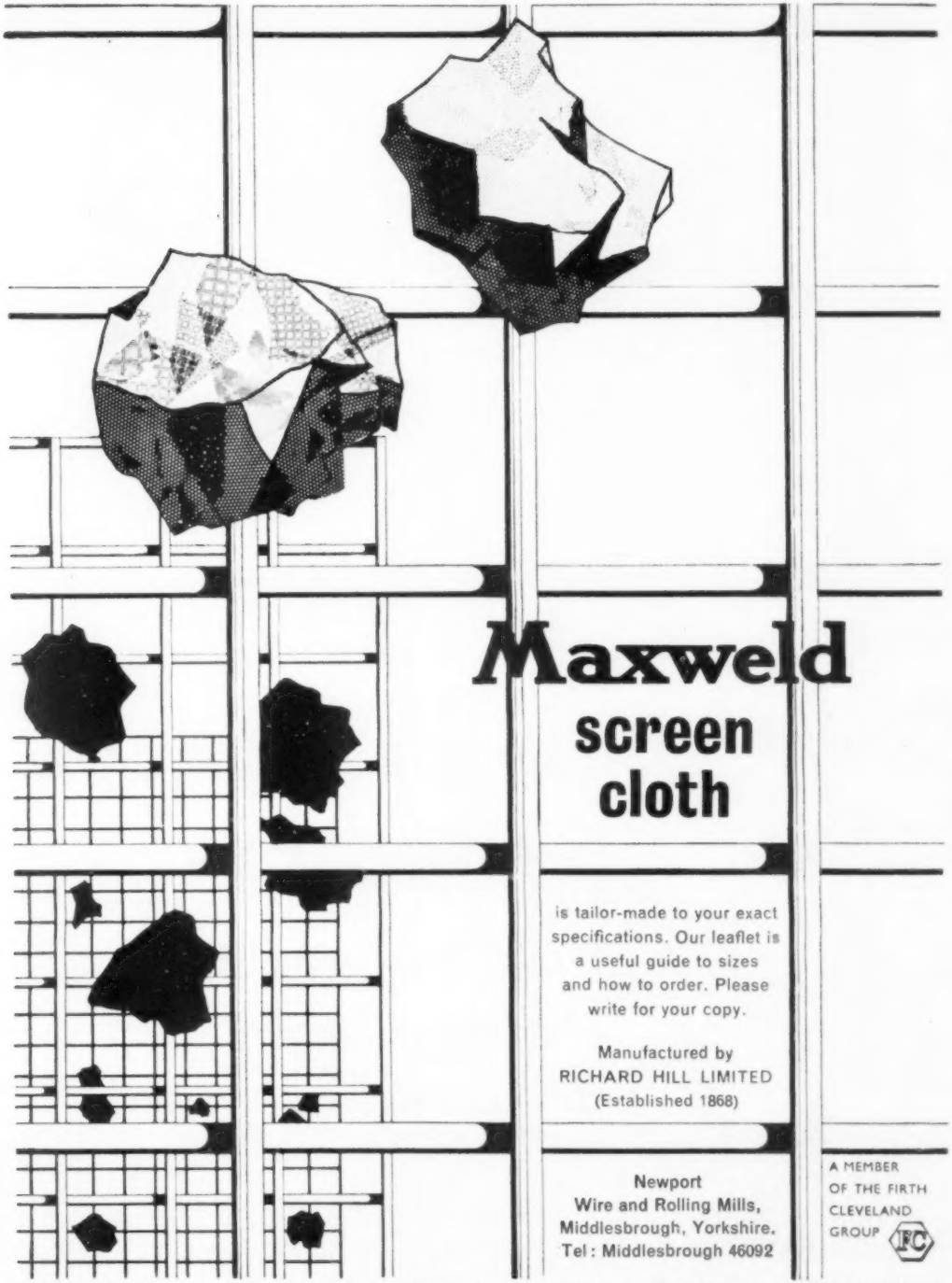

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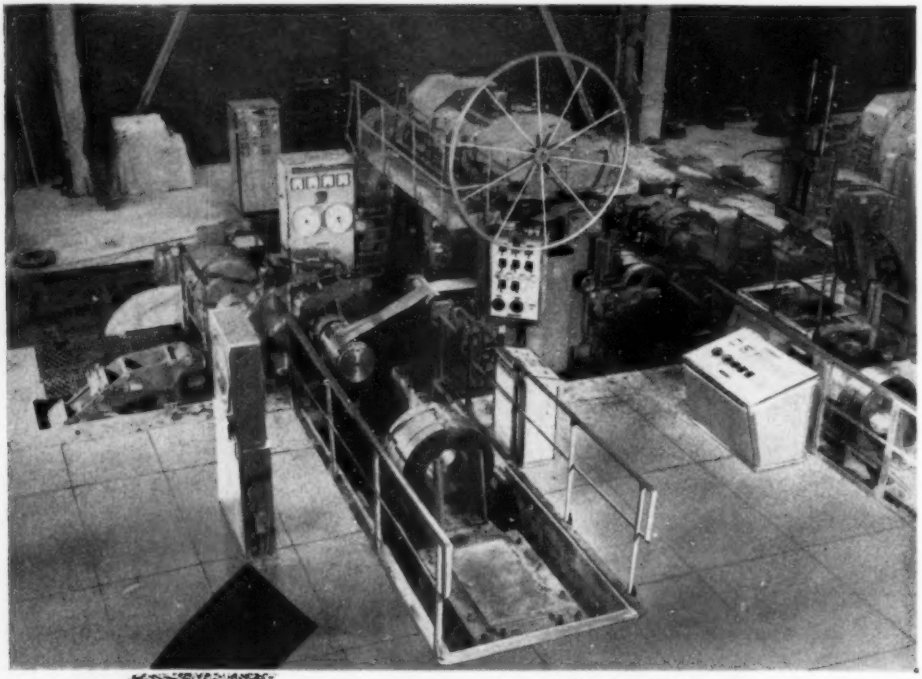

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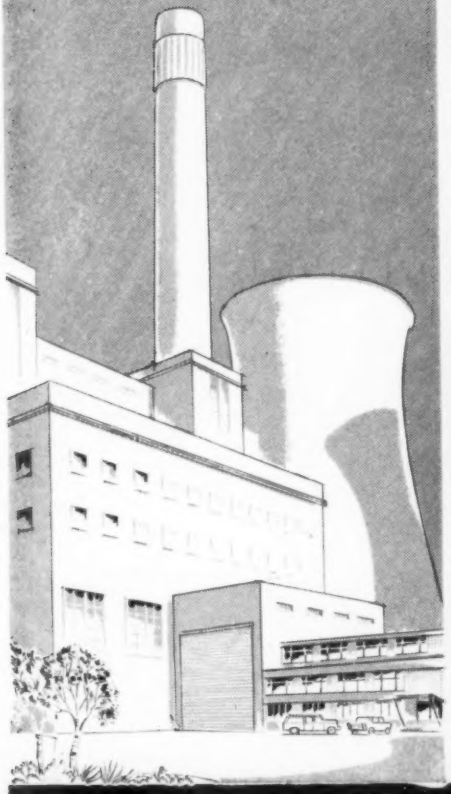
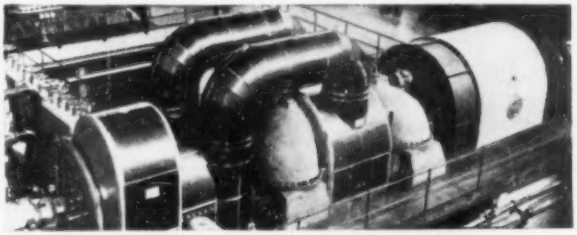
PARSONS

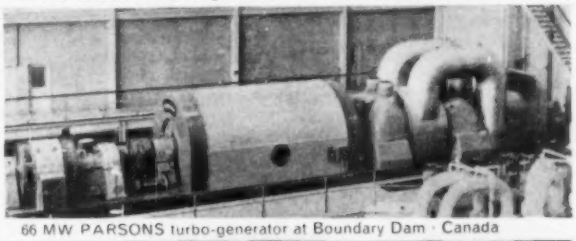
turbo-generator

installations

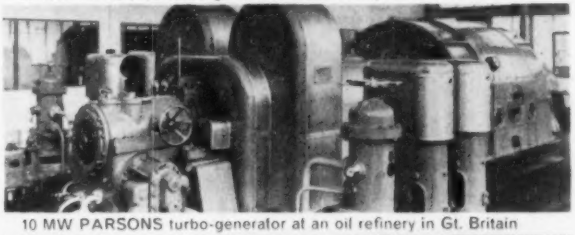




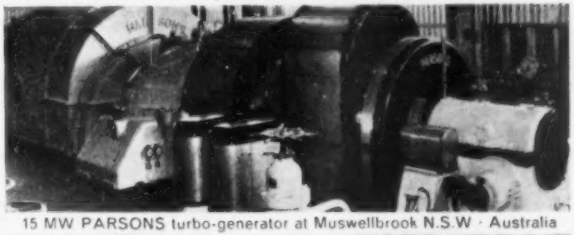
30 MW PARSONS turbo-generator at Colenso · South Africa



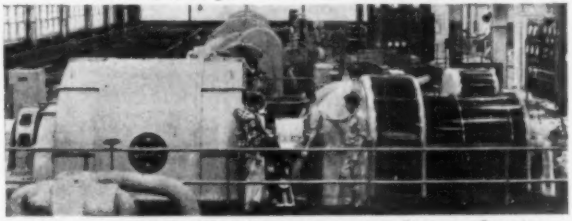
66 MW PARSONS turbo-generator at Boundary Dam · Canada



10 MW PARSONS turbo-generator at an oil refinery in Gt. Britain



15 MW PARSONS turbo-generator at Muswellbrook N.S.W · Australia



10 MW and 20 MW PARSONS turbo-generator at Trenton · Canada

C. A. PARSONS AND COMPANY LTD

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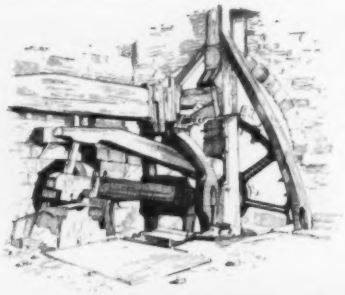
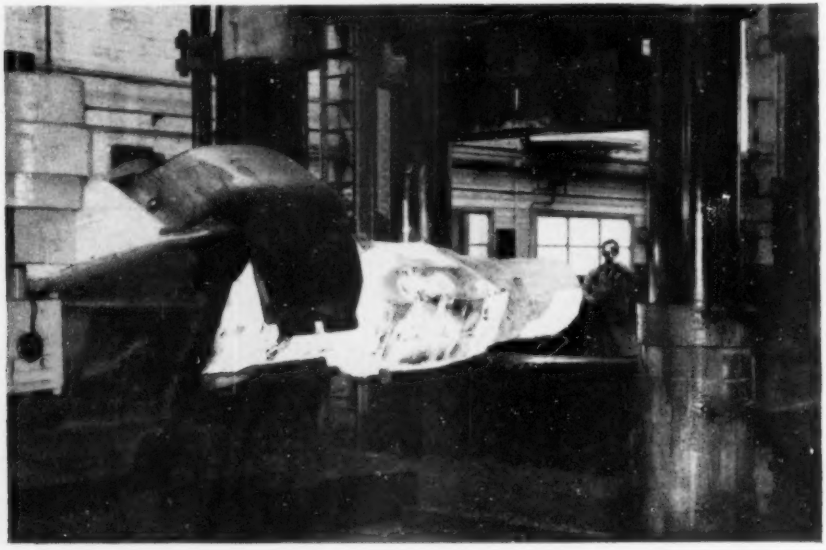
Steel in Both the Sixties





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Now—one hundred years later—Firth Brown are still acknowledged leaders in the making of the largest special forgings for Power Station Rotor Shafts, Forged Steel Rolls, and large units for Power transmission and Ships' propulsion.

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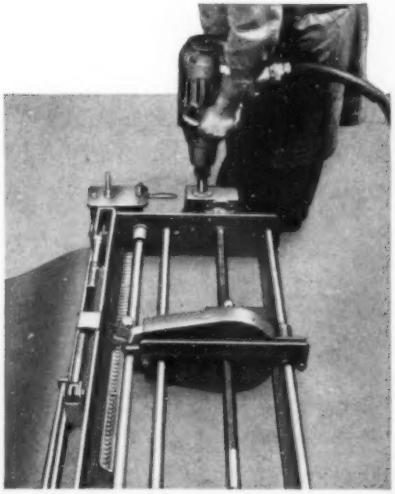
PR 37

This thoroughly dependable firebrick is a well-tried favourite in many industries where furnace linings need a 36/38% alumina quality.

J. T. PRICE & CO. LTD., STOURBRIDGE

and now... the 'POWER

It is possible that the advantages gained by the finest materials, design and care in manufacture, can be nullified by misapplication at the point of use. In the ultimate the most efficient joints are applied where operator fallibility has been reduced to the minimum. The introduction of the POWER ZIPPER has not only removed any possibility of error in belt jointing, but has reduced the operating time by OVER 50%.



ZIPPER!

Merely by applying the power of a rotary drill as illustrated the POWER ZIPPER will

Automatically

cut the belt end perfectly square

IN 18 SECONDS ON A 36" WIDE BELT

Automatically

Insert the HAYDEN-NILOS joint right across the belt in one setting

IN 70 SECONDS ON A 36" WIDE BELT

Nothing left to chance Guaranteed perfect joints ON ANY BELT

HAYDEN-NILOS
PATENTED CONVEYOR BELT FASTENERS

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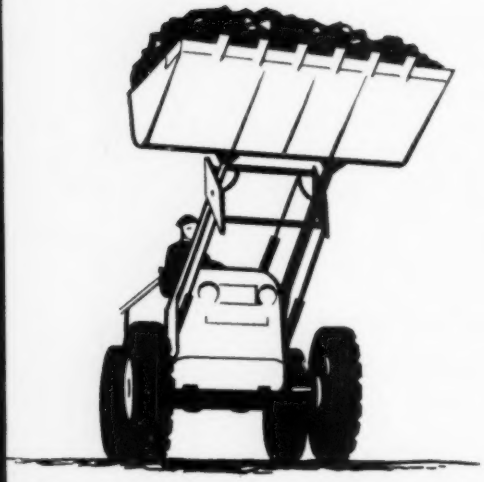
HN597

The place

COAL HANDLING WITH THE **CASE W12** AT



Wherever there's a tough materials-handling job, that's the place for Case. Case offers you:

STABILITY Rear-mounted engine, low centre of gravity and extra-wide track to ensure complete stability at all times.

SAFETY Bucket arms pivoted ahead of the driver to give increased safety, visibility and reach.

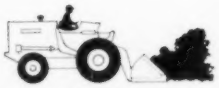
SERVICE Automatic free service at 50, 250, and 500 hours, regular free inspection and advice and a flying squad for emergencies to keep Case on the job.

Consider these advantages and you have—

the case for Case

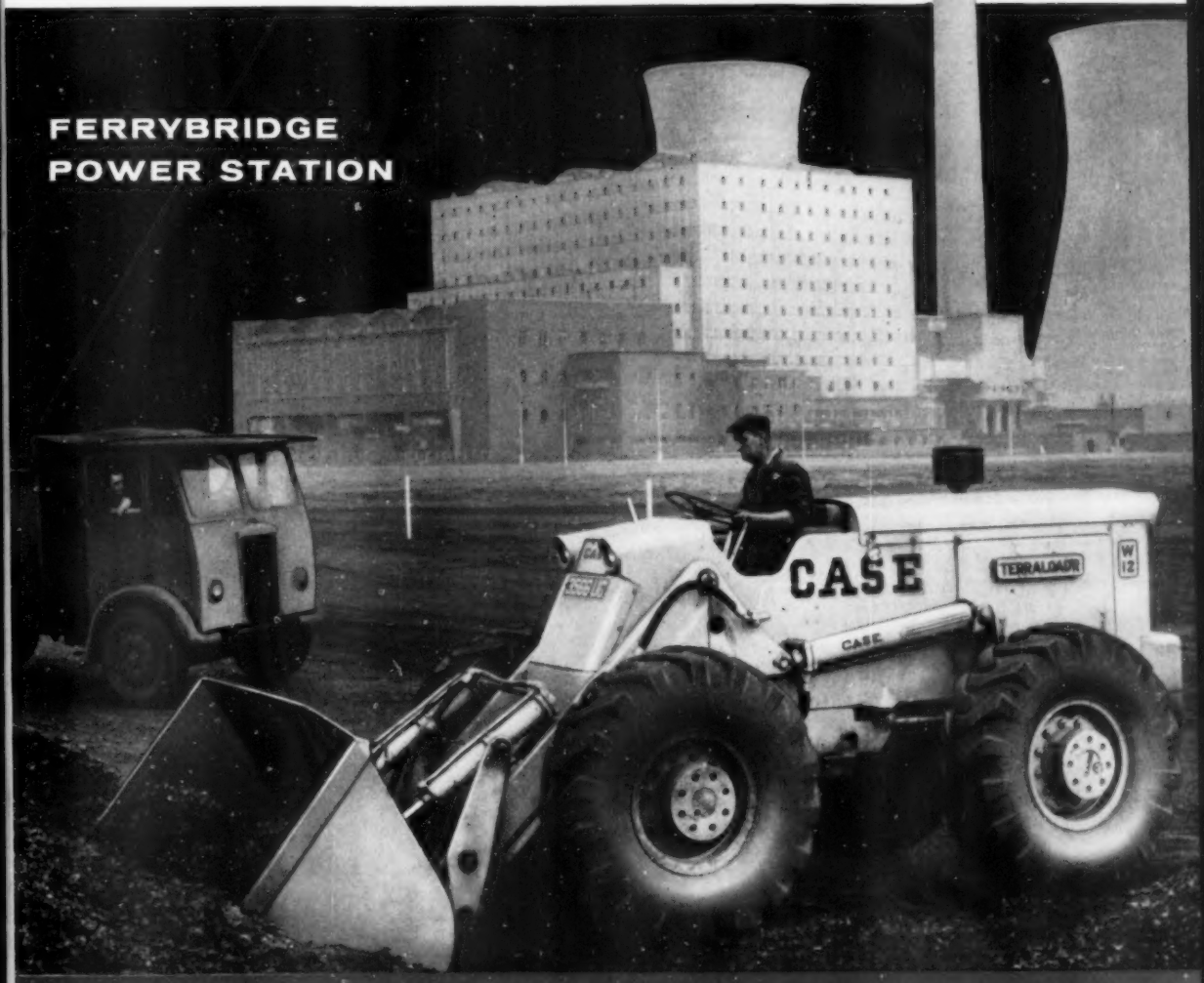
FROM THE **CASE** RANGE THERE'S A TERRALOAD'R TO FIT YOUR NEEDS

Better balance
Faster cycles
Greater visibility



	TERRALOAD'R W12	TERRALOAD'R W9	TERRALOAD'R W5
BUCKET CAPACITY	1⅜—3½ CU YD	1¼—2½ CU YD	1 and 1½ CU YD
HORSE POWER	120	80	57
LIFT AT 0 MPH	15,000 LB	11,000 LB	4,500 LB
CARRY AT 4 MPH	9,000 LB	5,500 LB	3,000 LB
BREAKOUT FORCE	23,500 LB	13,500 LB	7,800 LB
MAX. SPEED MPH	24	23	23
FORWARD REACH (to tyres)	6 FT 3½ IN	5 FT 2½ IN	3 FT 0 IN

for CASE.



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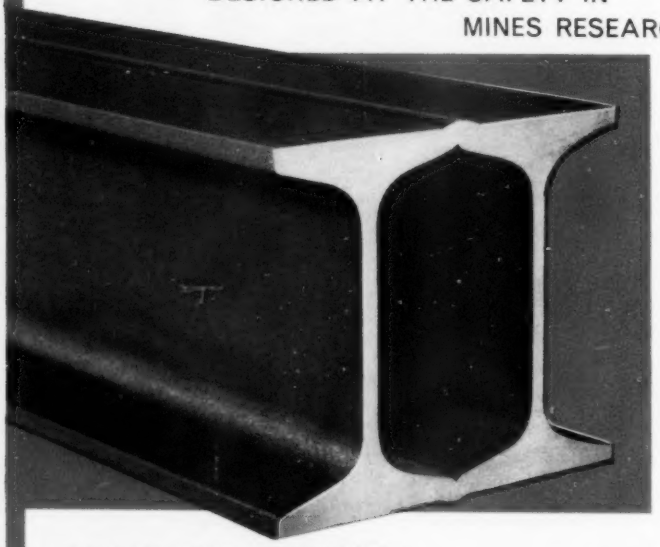


The New S.M.R.E. Roadhead Bar

TWICE THE STRENGTH . . .
FAR LONGER PIT-LIFE . . .
FAR GREATER SAFETY . . .
yet approximately the same weight and section as a standard R.S.J.!

The S.M.R.E. Roadhead Bar combines rigidity, stability and a high strength/weight ratio and can be handled as easily as standard R.S.J.'s. The design enables the space between props to be considerably increased to suit the machine layout without risk of crippling the bar.

Two 'I' section R.S.J's to B.S. 968 are welded longitudinally, then hardened and tempered to give high tensile strength.

OFFICIAL UNDERGROUND TESTS

Results of long term trials throughout the country by the N.C.B. have proved the life of the bar as being at least **10 times** that of a similar R.S.J.

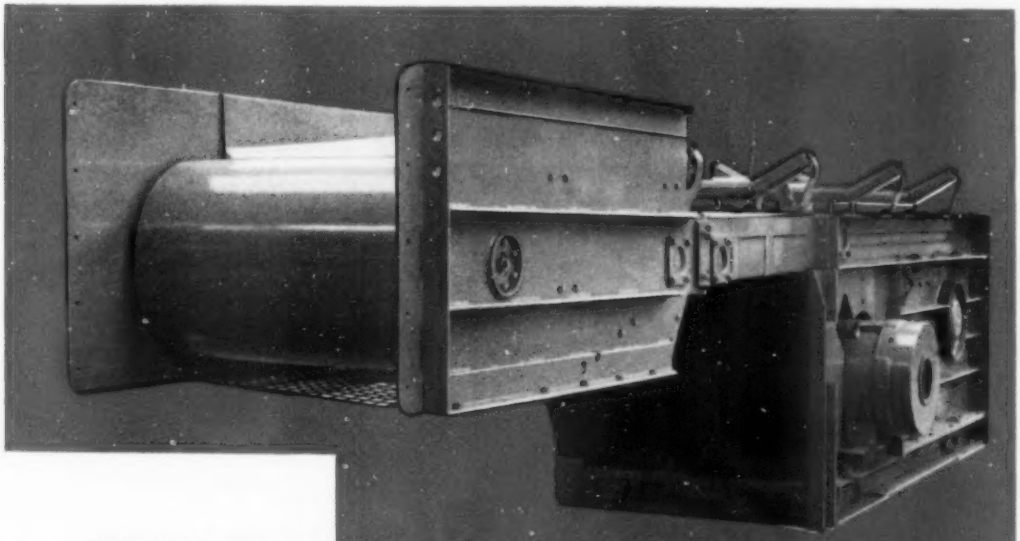
FULL PRODUCTION AUTHORISED

The S.M.R.E. Roadhead Bar is fully approved for underground use and is being manufactured by Joseph Wright & Co. (Fabrications) Ltd.

- 45 tons/sq. in. tensile strength
- 340 ton. in. transverse strength (3-point bend over 27½" centres)
- Weighs 16·5 lb. per ft.
- Heat treated steel to B.S. 968
- Low operational cost
- High resistance to lateral bending
- High resistance to twist and crushing
- 4¾" wide x 4" deep twin-web section.

AVAILABLE IN ANY LENGTH

JOSEPH WRIGHT & CO. (FABRICATIONS) **LIMITED**
PEAR TREE LANE,
DUDLEY
TELEPHONE: DUDLEY 52431



75R for hard work

B.J-D. Belt Conveyors thrive on hard work—the more you give them to do, the better they will show their capabilities.

The 75R Drivehead, shown above with extended jib, is fitted with a barrel type 75h.p. flameproof electric motor of B.J-D. manufacture, complying with B.S. 229 and B.S. 741. It can also be fitted with belt storage gear and loop take-up. With G-type intermediate structure and standard or impact tail-end, the 75R is a gate-belt conveyor of the highest class, good for many years continuous service. It is available for belt widths of 30ins., 36ins. or 42ins.

BJD

Gate Belt Conveyors

30 HP—60 HP—75 HP

BRITISH JEFFREY-DIAMOND LTD., WAKEFIELD, YORKS. LONDON: 15-17 CAXTON STREET, SW1

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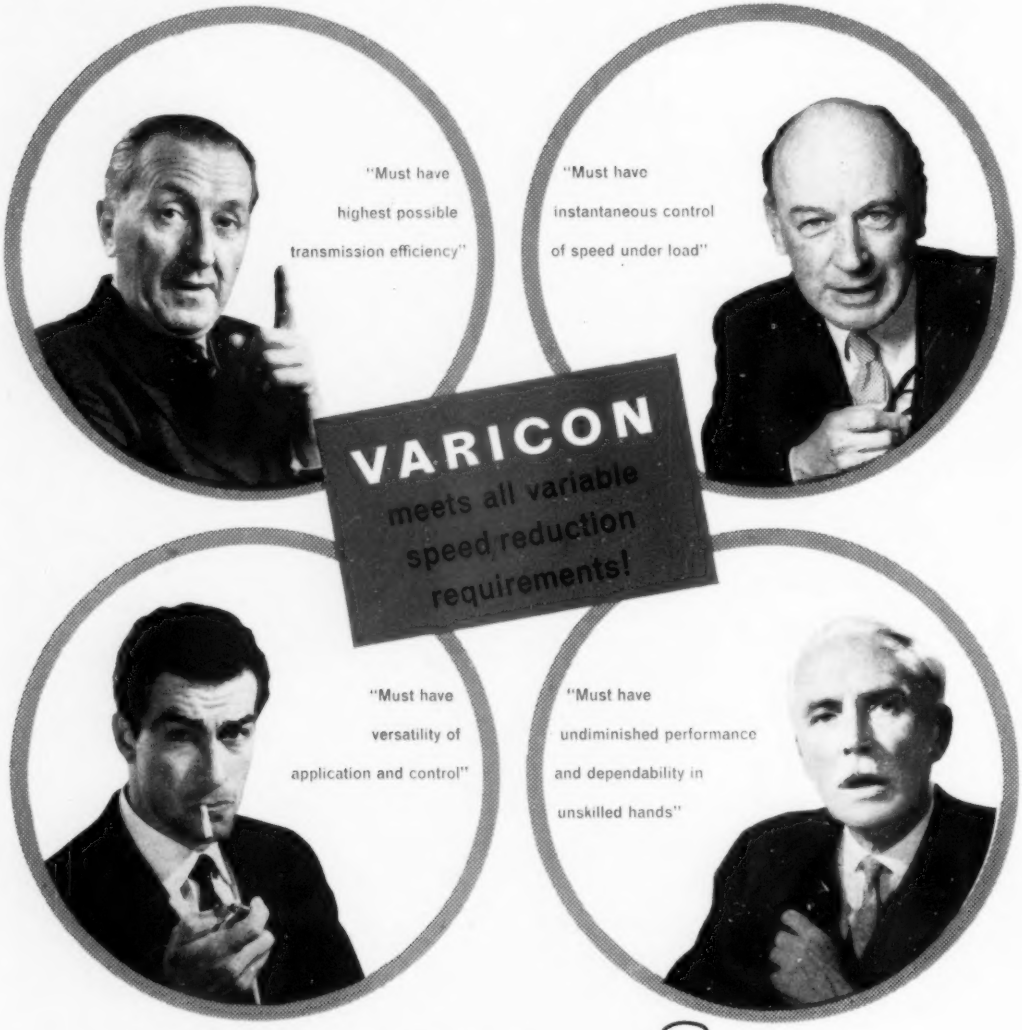
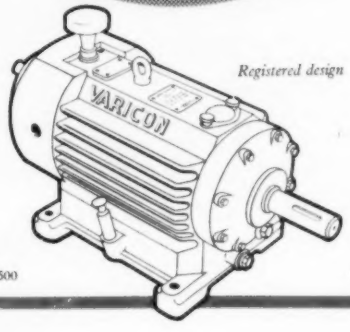
Four men in search of a stepless speed reducer


"Must have highest possible transmission efficiency"
"Must have instantaneous control of speed under load"
VARICON
meets all variable speed reduction requirements!
"Must have versatility of application and control"
"Must have undiminished performance and dependability in unskilled hands"

VARICON is made in sizes 2·5, 5, 10 and 15 H.P. Send for folder or, better still, let us know your specific needs.



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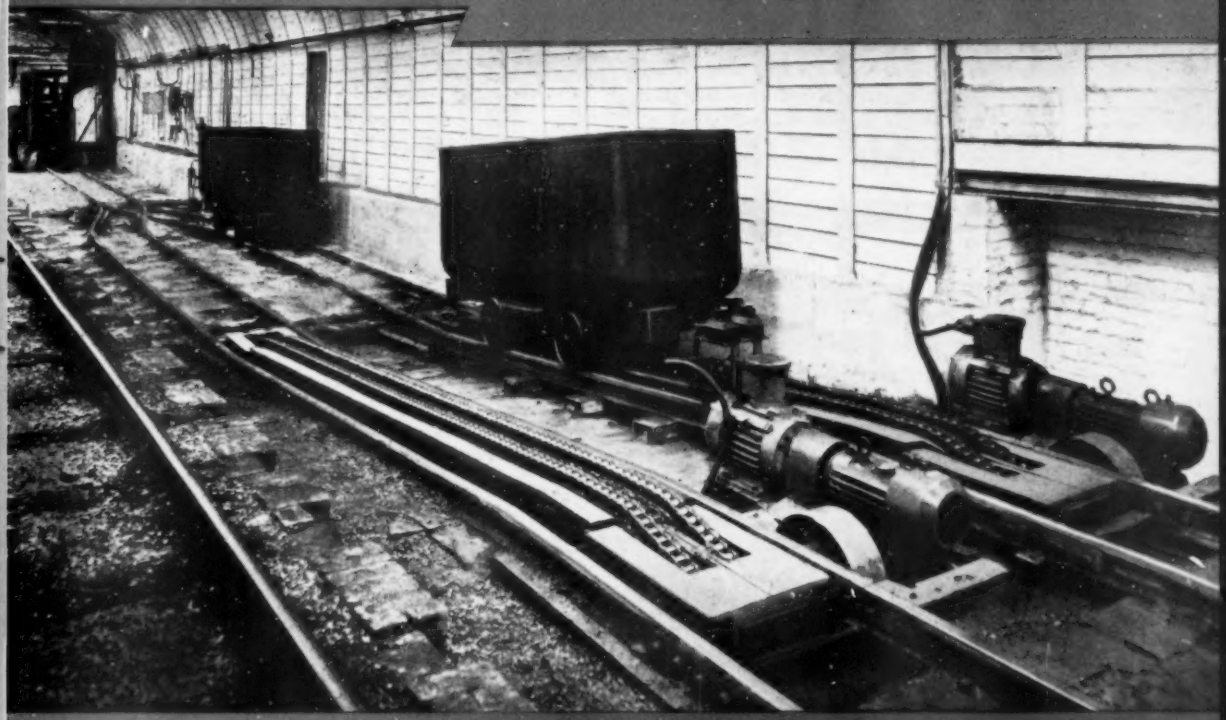
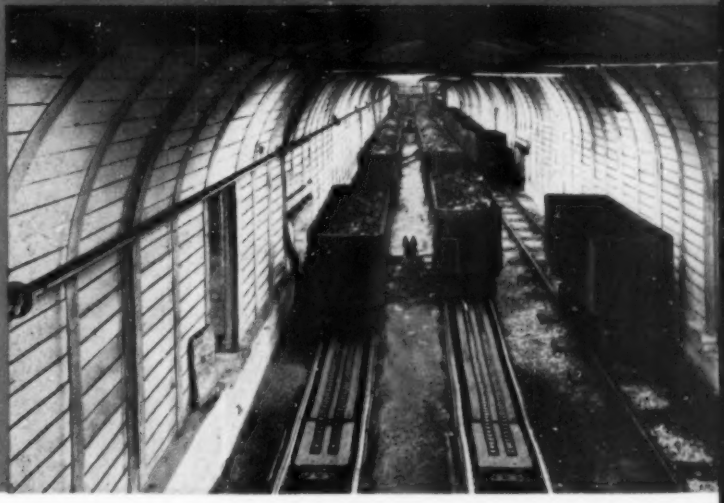


STILL THE SMOOTHEST
mine car feeder with its unique driving action

STILL the MOST EFFICIENT
car controller for positive retardation and car location

STILL the MOST RELIABLE
feeder – proved by scores of users over the last 12 years

Patent number 634876



A43M

QUALTER, HALL & CO. LTD.

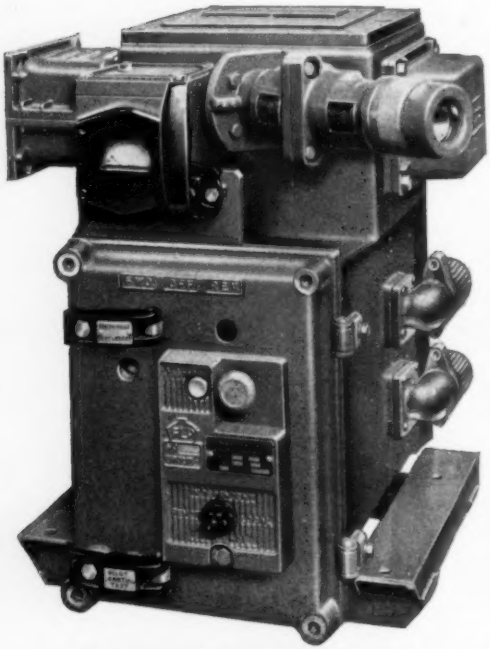
P.O. BOX 8, RAILWAY FOUNDRY, BARNSLEY

THE HALLMARK OF QUALITY

the Belmos SGU.30

30 ampere gate-end box

Designed in accordance with the NCB final draft specification the Belmos SGU.30 gate-end box provides features hitherto available only in the larger boxes



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2 **BUXTON-CERTIFIED for Group 1 gases – Certificate No. FLP 4318**

3 **Intrinsically safe EARTH LEAKAGE LOCKOUT circuit**

4 **Intrinsically safe remote control circuit complying with NCB SPECIFICATION P 130/1955**

5 **STALLED-CURRENT-BREAKING isolating switch**

6 **Remote control and sequence interlocking facilities**

Belmos * *Fully described in leaflet F 311*

the Belmos company limited

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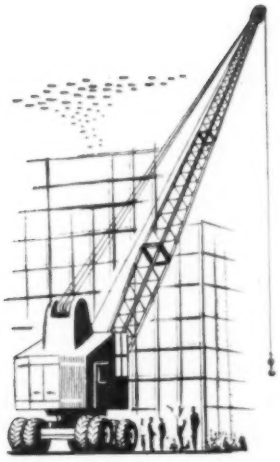
LONDON GLASGOW BIRMINGHAM NEWCASTLE MANCHESTER SHEFFIELD CARDIFF

We dismantle plant, machinery and industrial installations of all kinds



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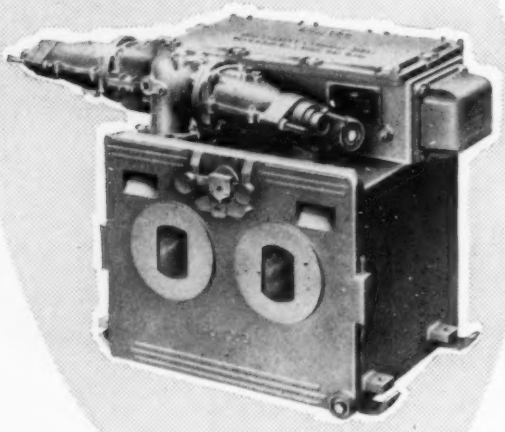

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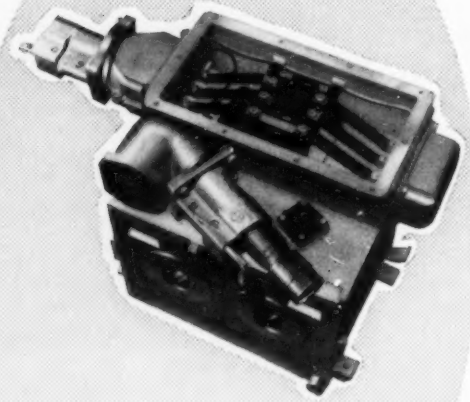

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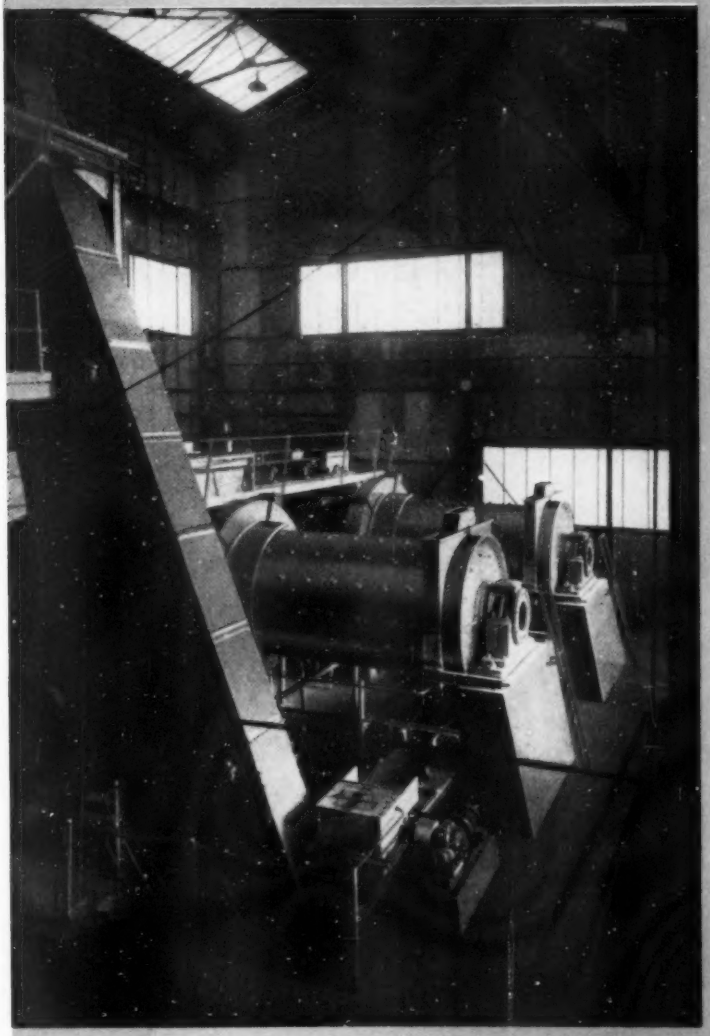

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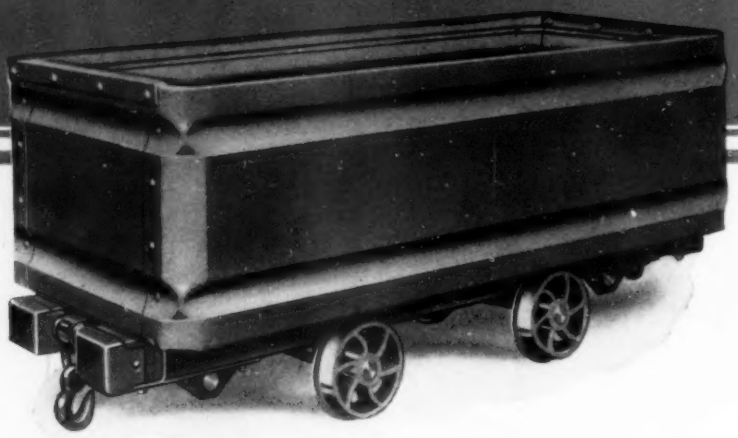

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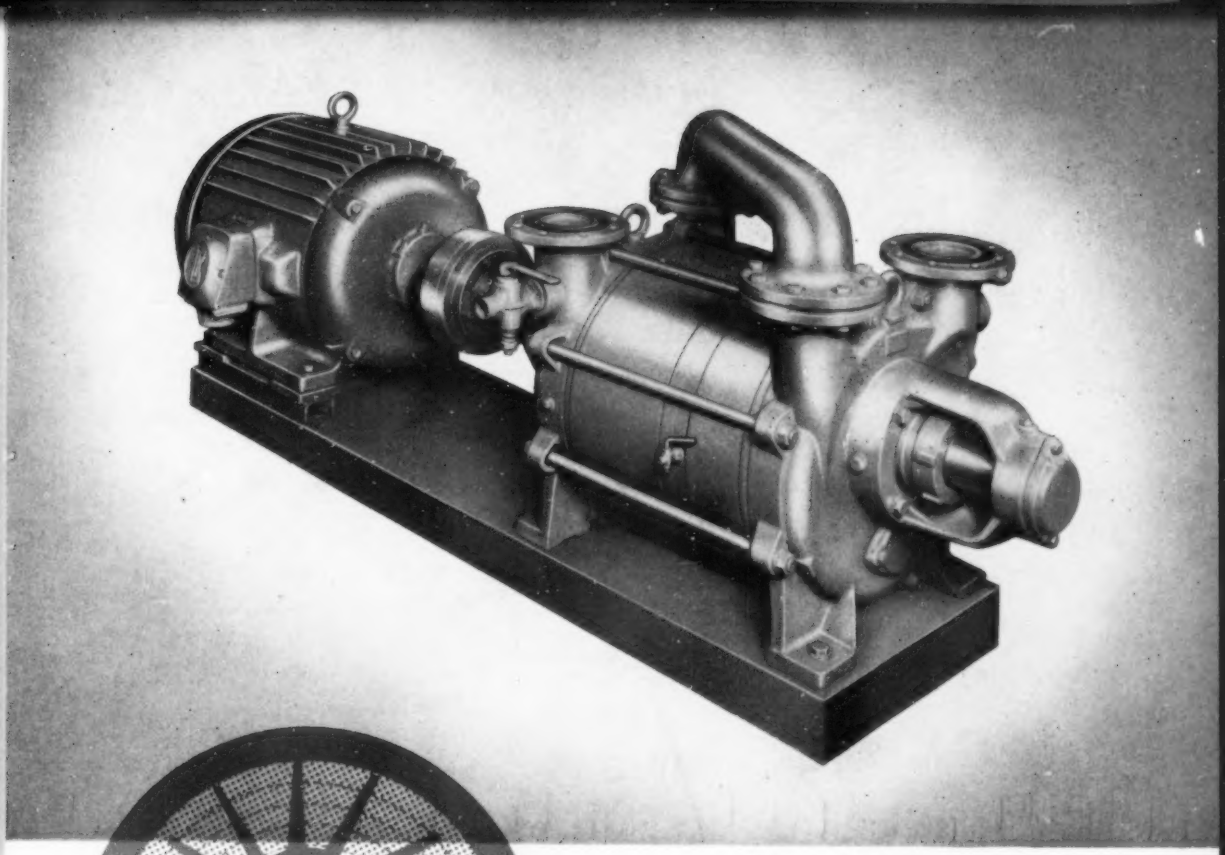

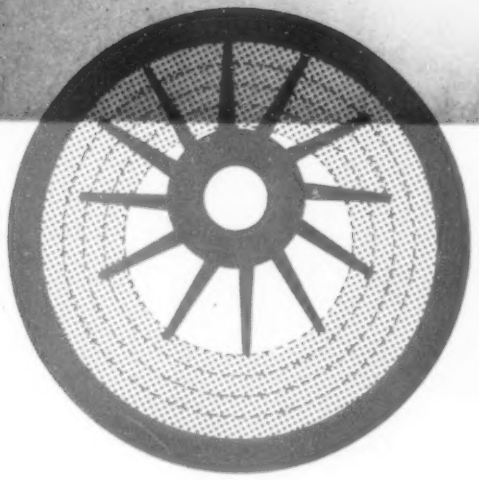

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IRON & COAL

ESTABLISHED

THE IRON AND COAL TRADES' REVIEW

APRIL 21
1961

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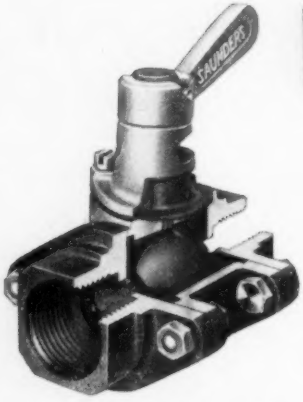

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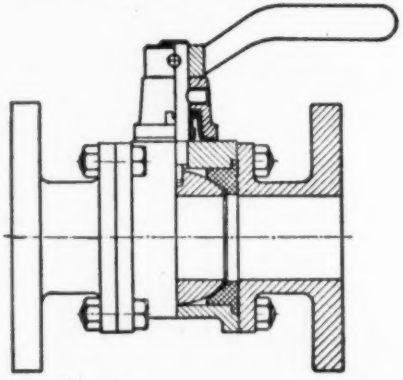

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IRON & COAL
THE IRON AND COAL TRADES' REVIEW

Vol. 182 April 21, 1961 No.4,840

The Budget

THERE is a current misconception that Britain is the most heavily taxed country in the world. In fact, looking at a set of OEEC figures for 1958, West Germany, France, Norway, and Sweden all stand ahead of the UK with taxes of 34.7 per cent., 31.6 per cent., 31.8 per cent., and 30.9 per cent., respectively, of gross factor income receivable. Britain follows with the figure of 29.7 per cent. for that year. In this analysis there is included direct and indirect taxes, capital levies, and contributions to social security. Nevertheless, taxes in the UK tend to be relatively smaller among the lower earners, but considerably higher in the upper brackets compared with other leading States. Thus, in the United Kingdom on a gross income of £1,000 the percentage taken in tax is 6 per cent. only, compared with the 11 per cent. in France and 10 per cent. in West Germany. At £5,000 the corresponding figures illustrate the change in emphasis—35 per cent., 32 per cent., and 27 per cent.

It became apparent that British business executives would sooner or later have to be placed in a similar position. The Chancellor, therefore, has decided that the point at which surtax begins should be raised from the old level of £2,000 to £4,000 for earned income, the cost of the concession being borne by industry out of an additional 2½ per cent. profits tax. It is not to be expected that the Chancellor's move will be appreciated at all levels, since most categories of taxpayers feel that they are entitled to an annual hand-out at Budget time. Nevertheless, the fact remains that surtax remained an anomaly that needed correction and the Chancellor has taken this opportunity to do it.

Industry has come in for several severe knocks. A novel imposition imported from abroad is the payroll tax calculated at say 1½ per cent. on the average wage assessed at 290s. per week in industry, compared with the modest West German outlay of 0.2 per cent. This, we are told, should yield £200,000,000 in a full year, but so far we are given but the scantiest details of how the new tax, if introduced, will operate.

In West Germany economy of labour or ability to ensure that the employer does not hoard labour is achieved by two methods neither of which are available in Britain. In the first place, heavy social security charges are shared by both the employer and the employee, *viz.*—Old Age and disability insurance contributions amounting to 14 per cent. of earnings shared equally by capital and labour; health insurance—employer and employee each contribute between 3½ and 4½ per cent. of earnings; unemployment insurance, employer and employee contribute 1 per cent.; accident insurance—imposed on the employer ranging between 1.6 and 2 per cent. of earnings; and, finally, family allowances—imposed on employer at a charge of 1 per cent. on the payroll. In the second place a payroll tax is levied based on the percentage above mentioned on monthly or quarterly payroll. These methods ensure *inter alia*, that employers make every effort to introduce or extend automation, bring in new techniques and replace workers urgently required for development work elsewhere, if they are not immediately required by the industry concerned.

The practice of making the worker carry the bulk of insurance charges is anathema to the British system, which continues to rely on very substantial Exchequer grants. The payroll tax has many disadvantages and, indeed, built-in difficulties. In places like Birmingham, where many kinds of labour are scarce it should operate to the advantage of local industry and the workers generally, but in some areas of the country prone to economic dislocation, it could lead to further unemployment. The measure would, therefore, have to be conditioned by some form of rebate in such instances. Development areas or scheduled areas under the 1960 Act could be declared exempt. It will be noted that the measure is not intended to become a permanent feature of the tax code. On the other hand, the yield would appear to be very satisfactory to the Treasury and administrative cost would largely be borne by others.

It seems hardly likely that it was mere coincidence that when Mr. Robens opened his campaign to restore the fortunes of the coal-mining industry, Budget proposals were near at hand to arrest the growth of oil consumption on the home market. Whether the proposals will have this effect remains to be seen. In Western Germany, following the Bunderstag levy on oils to aid the mining industry, increased costs were rapidly absorbed by petroleum interests lest they should lose the initiative in the fuel market. This is also likely to be the case in this country. In the south of England coal has experienced very serious opposition from the encroachment of oil and it is questionable whether the differential thus established by Budgetary levies will suffice for the purposes the Chancellor may possibly have in mind. On the other hand, the yield of £50,000,000 in a full year will make a useful increment to the national revenue.

The central theme of the Budget was export,

and it is problematical whether it will achieve its purpose. It is calculated to provide incentive, economy in the use of manpower, and the imposition of additional burdens on industry which industry may well absorb during the economic revival without seriously disturbing its costs structure. Those on smaller incomes receive none of the pickings, but it is only right to point out that they have reaped a modest harvest in past years and may probably do so again as this session of Parliament moves to a close.

£1,400,000 Scheme to Raise Output at Coalville Pits

SLOPING tunnel more than half a mile in length, dipping one in four to the coal from Snibston Colliery, Coalville (Leics), will be one of the central features of a £1,400,000 scheme designed to increase productivity at Snibston and nearby Whitwick Colliery. This surface tunnel, or drift, will eliminate completely the shaft-winding of coal at Snibston. Use will be made of an existing underground roadway connecting with Whitwick to raise two thirds of Whitwick's output up the drift as well, on a 42 in. cable belt conveyor able to carry 600 tons hourly.

The other main feature of the reorganization will be the construction of a large new coal preparation plant which will prepare all the Snibston-Whitwick coal brought up the drift, a total of about 3,900 tons daily. Snibston's output potential has always been limited by the size of the shafts. The increased capacity provided by the drift will allow an increase in the colliery's output of 500 tons to 2,400 tons daily. This will involve the opening of two additional faces. Streamlining of transport and coal preparation work will result in the saving of the work of 85 men, who will become available for redevelopment and upgrading.

The coal which is to come from Whitwick is at present being raised from the Whitwick No. 6 pit. It comes from the same seams as those worked at Snibston. Apart from the new common drift outlet for the coal, the two collieries will continue as separate organizations. Centralization of new coal preparation plant at Snibston will mean a considerable economy, as the existing separate installations at both units are out-dated and in need of replacement.

Snibston's surface will have been completely remodelled by the time the scheme is completed in 1964. There are also plans for new workshops, offices, medical treatment centre, and lamp room. Work on the drift is expected to begin this summer, starting from the existing underground workings. This heading will connect with drivage from the surface, scheduled to begin a little later on.

CHAIRMAN OF THE Dry Dock Owners and Repairers Central Council, Mr. George Morrison, commenting on the outcome of representations by the shiprepairing industry for improved taxation allowances in respect of investment in dry docks, expressed bitter disappointment that the Chancellor had not seen fit in his Budget to assist an industry which was struggling in the face of severe competition from countries where investment in new dry docks was treated much more generously for taxation purposes than in the UK.

Passing Thoughts . . .

THE place you work in is usually the place you live in. Most people spend more time at their office than at their home and those offices should be as bright and clean as your own houses. Oversea visitors to factories will judge a product as much by the condition of the workshop as by the sales talk of the management, and the publicity value of clean workshops should not be underestimated.—MR. A. J. NICHOLAS, managing director of South Wales Switchgear, Limited, speaking at a luncheon of the Cardiff and District Productivity Associaton.

Resources are not very interesting until you start doing things to them and engineers are probably the biggest—if not the most important—group of people who do things to resources.—The DUKE OF EDINBURGH, *giving the seventh Graham Clark Lecture.*

If the [steel] industry is to make full use of its capacity and help to support Britain's balance of payments, an extension of steel exports is essential. To achieve any substantial success in this field British steel prices will have to remain fully competitive and if British coal prices compel the industry to lessen its dependency on coal, it can hardly be blamed for doing so.—Man and Metal, journal of the Iron and Steel Trades Confederation.

Knowledge, to be effective, must be shared. The problem of communication is therefore not merely ancillary to science, but is part of the stuff of science itself.—Opening sentences of a paper on "Information—an Educational Problem" presented by DR. M. R. HOPKINS, *senior lecturer, Department of Physics, University College of Swansea, before the DSIR Conference this week.*

We cannot turn the clock back as far as the present location of industry is concerned, but we can ask ourselves to what extent we can reduce the pressure of demand for British coal by replacing it in certain areas with imported coals and fuel oil. . . . There is no truth in the argument that a reduction in British coal output and an increase in foreign imports of coal and oil would weaken the pound.—GEORG TUGENDHAT in an article in The Guardian.

"Upward price adjustment," neat as it may look in nationalized bookkeeping, may not always help to balance the accounts. Even a good trade union customer may decide that nationalized coal has priced itself out of the market.—The Guardian.

It is worth reflecting, for example, on the esteem in which the Coal Board would be held if it had dared to charge a "commercial" price for its products during the past 10 years. Annual profits would have run at the rate of £200,000,000. The board would have been acclaimed the greatest economic success of the century.—Daily Herald.

INSTITUTE OF FUEL LUNCHEON

GUEST speaker at the annual luncheon of the Institute of Fuel in London on Wednesday was Sir Julian Pode, managing director of the Steel Company of Wales, Limited, and chairman of the Fuel and Power Consumers Policy Committee of the Federation of British Industries.

A full report of his speech will be published in next week's IRON AND COAL.

DOUBLE FIRST

Scottish Coal Board's Aim

FIRST National Coal Board Division to introduce packaged fuel, Scotland hopes to be the first again in introducing coal vending machines. Speaking at a Press conference last week in Glasgow, the divisional chairman, Mr. R. W. Parker, said that a prototype of a coal-vending machine had just been developed in Britain and the division hoped to be the first to go on the market with " this further evidence of the board's progressive action."

He also announced that since the board had pioneered pre-packaged fuel under the trade name of Nuggets, the innovation had been adopted most successfully by many merchants throughout Scotland. The board was now about to launch a new 28 lb. package on to the market under the trade name " Readiburn." It would contain eight 3½ lb. packs of fuel, one of which contained a firelighter together with a special readily ignitable fuel.

Mr. Parker, who was launching in Scotland the campaign to stimulate sales of solid fuel, said that this year about 19,000,000 tons of Scottish coal would be produced and the board intended to do all it could to make sure that markets for this coal were maintained and strengthened.

£60,000,000 in Wages

Stressing the importance of a progressive coal industry to the social and economic life of Scotland, the chairman said that in 1960 about £60,000,000 was paid for wages and salaries to the 82,000 employees of the NCB in Scotland. In the same year the board purchased for use in Scotland, plant and materials worth over £23,000,000, including over £2,000,000 worth of timber, of which 97 per cent. was grown in Scotland. Scottish-produced steel, too, was bought to the extent of about £2,000,000 and electric power to the value of £3,000,000.

" We have much leeway to make up," he said. It was only a very short time since the years of shortage when every encouragement was being given to the use of other fuels and the very thought of an aggressive and active campaign to sell more coal would have been regarded as " much against the public interest."

Today, the weight of past capital expenditure, the development and expansion of power loading, and the closure of some low productivity pits were all combining to increase productivity—the fundamental factor in price stability. Many millions of pounds, too, had been spent in providing new modern mechanical coal-cleaning plants to ensure the proper preparation of coal before it left the colliery. There were 16 such plants in Scotland alone.

The industry faced acute competition, but, said Mr. Parker, " I believe that coal will continue to serve the principal needs of the nation for a very long time to come and what really concerns my board is to see that we serve it well."

SPECIAL MOBILE SALES SHOP of Adcock & Shipley, Limited, machine-tool manufacturers, of Leicester, is making a tour of Holland and Germany. Mr. John Baugh, East Midlands technical representative, is in charge.

More Housing if Coal Output to be Raised

HOUSING in relation to coal production is to be discussed in South Wales and Yorkshire. Because of a shortage of miners, production at Nantgarw Colliery, Glamorgan, has not been able to achieve the target set. In an endeavour to attract more men to the pit the South-Western Divisional Coal Board has asked Caerphilly Urban District Council if it is prepared to build 150 houses near the colliery to let to miners employed at Nantgarw. The board has offered subsidies under certain conditions.

Planned peak manpower at the colliery is 2,000 men underground and 300 on the surface, but so far total manpower at the colliery is only 500 and the board would like to double this number.

In Yorkshire, the North-Eastern Division of the NCB has said that it will require about 12,000 recruits and has asked Doncaster Rural District Council to discuss the possibility of housing for local and incoming mineworkers. The greatest need for recruits is in south Yorkshire and particularly the Doncaster area.

NEW PRICE-LIST FOR RUHR COAL

RUHR coal producers have presented to the High Authority of the European Coal and Steel Community new price-lists for the current year. They are similar to former price-lists except that they exclude the previous summer rebate for the popular anthracite nuts No. 3. It is expected that lists to be made up by Charbonnages de France, the nationalized French coal concern will incorporate price reductions for 1961.

Aix-la-Chapelle coalfields in West Germany announce a record production for last year of 8,188,000 metric tons. This is 3.72 per cent. higher than in 1959. Not only were all saleable amounts of coal produced over the year marketed, but almost 285,000 tons of coal stocks were also sold. Production in the area of pit coke rose by 6.54 per cent. over the year and that of briquettes by as much as 28.17 per cent. Brown coal output fell, however, by some 7.1 per cent. over the year to 10,400,000 tons crude, while brown coal briquette production decreased by 11 per cent.

Mr. HENRY CROSS has completed 62 years' service at the Novo Steelworks, Sheffield, of Jonas & Colver (Novo), Limited. He is now 75 years old and started with the firm when he was 13.

Personal

Youngest President of Plant Engineers

YOUNGEST president in the history of the Institution of Plant Engineers, Mr. G. D. JORDAN, is presiding at the 14th annual conference of the institution at Blackpool this week. Born in 1925, he graduated in engineering at Sheffield University in 1944. He joined Samuel Fox & Company, Limited, branch of the United Steel Companies, Limited, in 1947, as technical assistant to the chief engineer and was appointed lubrication engineer in 1948.

Mr. Jordan transferred in 1956 as senior engineer in United Steel's department of operation research and cybernetics, and is at present project secretary for the operation "Spear" electric melting shop scheme at the Steel, Peech & Tozer, branch of United Steel. He received a James Clayton Fellowship of the Institution of Mechanical Engineers in 1953 and toured the UK, Canada, and the US to study lubrication engineering. He was the winner of Alexander Duckham Memorial Awards of the Institution of Plant Engineers in 1949, 1950, and 1958.

Following his retirement earlier this month as chairman of the London Tin Corporation, Limited, Mr. J. IVAN SPENS has been appointed president.

Mr. SAM NEIL, undermanager at Seaton Delaval Colliery, Northumberland, has retired at the age of 64. He started work at the colliery 52 years ago.

Mr. R. HIRST, method engineer, No. 1 Area of the Durham Divisional Coal Board, has been elected chairman of the Newcastle-upon-Tyne section of the Northern region of the Institute of Work Study.

After 38 years' service with Associated Electrical Industries, Limited, Mr. ARTHUR CLIVE LANE, section leader and design engineer (a.c. commutator motors) of the medium electrical engineering department, heavy plant division, has retired.

Mr. IAIN M. STEWART, chairman of Thermotank, Limited, Glasgow, has been elected president of the Institution of Engineers and Shipbuilders in Scotland. He takes over in October from Mr. John Brown, managing director of John Brown & Company (Clydebank), Limited.

Mr. S. WEINBERG, chief engineer (specialist services) of the National Coal Board, has been invited by the American Mining Congress to address it on underground belt conveying at its annual congress which is being held at the Coal Show in Cleveland, Ohio, from May 15 to 18.

Mr. JAMES GERRARD, managing director of Wright Anderson & Company, Limited, structural engineers and bridge builders, of Gateshead-on-Tyne, is to give up his position as chairman of the Northern Counties branch of the Institute of Directors, on account of ill-health. He has occupied the position for six years.

Mr. J. S. BAILLIE, publicity manager of Bruce Peebles & Company, Limited, who has retired, joined the company as an apprentice in 1911, and served for some years in the rotating plant test department. In 1924 he joined the contracts department with special responsibility for publicity matters, and was appointed publicity manager in 1936.

Composition of the Divisional Committee No. 5—non industrial applications of the Electrical Research Association, includes Mr. E. G. PLUCKNETT, director of Tube Investments, Limited, Mr. R. SMITH, General Electric Company, Limited, Dr. G. F. TAGG, Evershed & Vignoles, Limited, and Mr. H. C. TIMEWELL, English Electric Company, Limited.

After almost 65 years with the Lancashire Steel Manufacturing Company, Limited, Ald. JOSEPH POOLE has retired. Since 1914 he has been workers' representative of the Bewsey and Dallam branches of the standing committee of the Midland Iron and Steel Trades Association. He was Mayor of Warrington in 1935-36 and made Freeman of the borough in 1956.

Second retirement for Cllr. SAM SALES is from Chesterfield Rural District Council. At 81 he is "father" of the council on which he has served for 33 years, five of them as chairman. Before his first retirement he had spent 60 years in the mining industry, starting as a firelad at the age of 12. At the age of 70 he was appointed canteen manager at Grassmoor Colliery. He served as president of the Derbyshire Miners' Association in 1939.

Area Management Changes in East Midlands NCB

PRODUCTION manager in the No. 3 (Edwinstowe) Area of the East Midlands Divisional Coal Board since 1955, Mr. P. C. Parry has been appointed general manager of No. 5 (Eastwood) Area to succeed Mr. Thomas Wright, who has left to become general manager of No. 4 (Aberdare) Area, South-Western Division. Mr. Parry, who is 49, was production manager in the No. 8 Area, South-Western Division, before transferring to the East Midlands Division in 1951, in which he has held a number of management posts.

The division also announces the retirement in June of Mr. F. D. Severn, general manager of No. 4 (Huthwaite) Area since 1952. He will be succeeded by Mr. H. B. Bennett, at present production manager in No. 7 (Coleorton) Area. Mr. Severn was for 16 years manager of Brookhill and Pinxton Collieries, and became production manager in the No. 4 Area in 1951. Mr. Bennett has held previous posts as Area No. 7 development engineer and No. 3 Area group manager.

Durham NCB's New Area Production Manager

IN succession to Mr. W. O. Blenkinsopp, who is retiring, Durham Divisional Coal Board has appointed Mr. E. E. Cleaver, at present deputy Area production manager (operations) in No. 2 Area, as Area production manager, No. 4 Area. Mr. Blenkinsopp, who has spent over 45 years in the mining industry, has held the posts of agent for the Murton and South Hetton group and the Vane Tempest, Dawdon, and Seaham group, and as deputy to the post he is now relinquishing.

Mr. Cleaver, who is 48, held managerial appointments in Warwickshire, Lancashire, and Yorkshire before being appointed in 1951 as group agent for "C" Group, No. 2 Area, Durham Division. He was subsequently group manager "A" Group in No. 2 Area from 1955 until he was appointed to his present post in 1957.

Steel Exports Rise

IMPROVEMENT IN THE EUROPEAN MARKET

EXPORTS of steel from the UK during the first two months of this year were at an average of 259,000 tons a month, in line with the expectation of a further rise in exports above last year's improved level, although the export market is highly competitive, the Iron and Steel Board stated last week. Markets taking increased deliveries were many Commonwealth and European countries, including particularly New Zealand, Sweden, West Germany, and Greece. The increases were partly offset by a fall in exports to North America and China.

Imports of steel during the first two months of the year, at 52,000 tons a month, were well below the average rate for 1960. Current imports in most cases represent the closing deliveries against commitments entered into earlier, and arrivals are therefore expected to decline further.

Net exports of steel are rising strongly, the board states, and appear to be resuming the upward trend established during recent years. The monthly average in January and February was over twice as great as that during the 10 years after the end of the war and four times as great as the average in the years immediately before the war.

Steel Output Since 1957

Figures given by the board show that the monthly average of exports of 259,000 tons in the first two months of this year compares with a monthly average of 242,000 tons in 1960. Average monthly imports of 52,000 tons so far this year compare with 103,000 tons in 1960. Net exports so far this year were therefore at the average monthly rate of 207,000 tons, compared with 139,000 tons in 1960.

Figures showing output of steel and pig-iron in the first quarters of each year since 1957 are given by the board. They are: Steel, 1957, 5,532,000 tons; 1958, 5,475,000 tons; 1959, 4,631,000 tons; 1960, 6,240,000 tons; 1961, 6,210,000 tons. Pig-iron, 1957, 3,464,000 tons; 1958, 3,516,000 tons; 1959, 2,908,000 tons; 1960, 3,957,000 tons; 1961, 4,011,000 tons.

The board says that early indications of stock movements during the first quarter this year, although not comprehensive enough to be entirely reliable as a general guide, suggest that the substantial stockbuilding which took place during last year has come to an end. The use of steel appears to have been at least maintained at last year's level. The cessation of stockbuilding has in the main resulted in a fall in imports of finished steel.

ECGD SENIOR STAFF CHANGES

ESTABLISHMENT of a new division to deal with export finance guarantees recently announced by the President of the Board of Trade, is announced by the Export Credits Guarantee Department.

The new division will be known as Financial Guarantees and Policy Division and will be in the charge of Mr. R. A. Dickinson, who is succeeded as director of the general division by Mr. C. P. Rawlings. Mr. P. H. Garrity becomes director of overseas division in place of Mr. Rawlings.

Export Aid Measures Welcomed by Davy-Ashmore Chief

LAST week's Government measures to improve British facilities for export finance and export credit insurance were welcomed by Mr. M. A. Fiennes, managing director of Davy-Ashmore, Limited, and chairman of the recently-formed Davy-Ashmore Export Company, Limited, in Amsterdam last Friday. He was speaking to a group of about 20 British industrial investors and other financial experts who had completed a three-day visit to Holland, as guests of the Amsterdam bankers, Pierson Heldring & Pierson. Among the Dutch concerns visited were the Hoogovens steelworks and the Wilton-Fijenoord shipyard.

Referring to the aiding of the "developing" countries, Mr. Fiennes suggested that such aid should be internationally and centrally organized. He said that companies like his own, which is Europe's largest builder of blast furnaces, would be driven to manufacturing in the customer countries, and he mentioned Australian and India in this respect.

The developments in the services are welcomed by the shipbuilding industry, states Col. T. Eustace Smith, president of the Shipbuilding Conference. They would help to solve the problem of matching credit terms offered by competitor countries. The real test of the new arrangements would be whether, with the ECGD guarantee, funds would be readily forthcoming from the banks and other City institutions to finance shipbuilding projects.

Another Appleby-Frodingham Ajax Steel Record

ANOTHER output record has been set up by the "P" Ajax furnace in the melting shop of the Appleby-Frodingham Steel Company, branch of the United Steel Companies, Limited, at Scunthorpe (Lincs). This is the fifth time the output figures have been broken since conversion to the Ajax system in January this year.

During the week ended April 1, 5,368 tons of ingots were made, the previous best being 5,301 tons made during the week ended February 11.

IN RECOGNITION of their long service with the company, 36 employees of Stewarts and Lloyds, Limited, steelmakers, etc., of Glasgow, have been presented with watches by Mr. J. G. Stewart, managing director.

Obituary

SIR ROGER DUNCALFE

DEPUTY-CHAIRMAN of the Beaver Committee on Air Pollution in 1954-55, and a vice-president of the Federation of British Industries, Sir Roger Duncalfe died at Bournemouth last Saturday at the age of 76. Sir Roger was chairman of British Glues & Chemicals, Limited, from 1946 to 1957, and was also closely associated with Standards work, being president of the British Standards Institution in succession to Lord Waverley for three years from 1953. From 1956 to 1958 he was president of the International Organization of Standardization.

Educated at Tettenhall College, Wolverhampton, and Nottingham University College, Sir Roger also served on behalf of industry in other directions. He was president of the Federation of Gelatine & Glue Manufacturers, Limited, from 1947 to 1955, and a former chairman and president of the Association of British Chemical Manufacturers. Long active in the service of the FBI, he was chairman of its technical legislation committee from 1947 to 1955. He was knighted in 1951.

Mr. ERNEST E. THUM, editor-in-chief of Metal Progress, died on April 10. Well known on both sides of the Atlantic, Mr. Thum founded Metal Progress on behalf of the American Society of Metals.

The death has occurred of Brevet Col. JOHN HODGART, a director of Fullarton, Hodgart & Barclay, Limited, engineers, of Paisley (Renfrewshire). Col. Hodgart was engaged in bomb disposal working during the war.

Deputy chief electrical engineer at the Ebbw Vale (Mon) steelworks of Richard Thomas & Baldwins, Limited, Mr. TOM LLOYD has died at the age of 60. He had been with the company since 1938 and took up his last appointment in 1960.

Chairman for many years of Ibbotson Bros. & Company, Limited, Sheffield, Mr. JOHN WILLIAM RAMSDEN died recently. He started work in the firm's office in 1914. Mr. Ramsden was also managing director of the associated firm of Willford & Company, Limited.

Mr. THOMAS HENRY SMITH, a worker since 1916 at Heenan & Froude, Limited, manufacturing engineers, of Worcester, who has died aged 66, was life-president of Worcester City Football Club and vice-president of Worcestershire FA. His interest in football began when he was made secretary of the firm's club.

Former chairman and co-founder of the Premier Lamp & Engineering Company, Limited, manufacturers of miners' acetylene lamps, etc., of Leeds (Yorks), Mr. R. L. WOOSNAM has died at the age of 76. He was the sole surviving original member of the firm and retired from active business less than a year ago.

Mr. JOHN EVANS, MP for the Ogmore Division of Glamorganshire from 1946-50, died on Tuesday at the age of 85. He started work in a coal mine at 12 years of age and worked as a miner for 21years. After two years at Ruskin College, Mr. Evans became miners' agent for the Caegnant Lodge of the old South Wales Miners' Federation.

While on a visit to the Swansea plant of the Pressed Steel Company, Limited, on Wednesday, the death took place suddenly of Mr. ERIC GEORGE ROWLEDGE, a local director of Pressed Steel and the senior director of the Prestcold division. Mr. Rowledge, who was 62, had been with the company for 27 years, and was a leading figure in the refrigeration industry.

The death has occurred of Mr. JOHN C. COLEMAN, managing director of Ardrossan Dockyard Company, Limited. He joined the company in 1928 as engineering manager, was subsequently appointed yard manager and, in 1947, became managing director. He was a member of the Institute of Marine Engineers and a member of the Institute of Engineers and Shipbuilders in Scotland.

Only nine months after his retirement, the death has taken place of Mr. T. W. FENTON-BOLLAND, formerly general manager for British Ropes, Limited. He began his career in 1919 with the Doncaster Wire Company, Limited, which was later acquired by British Ropes. He had worked at the Retford and Birmingham works and had been general manager of the wire mills at Doncaster for 13 years before retiring.

Durham NCB Aims to Recruit More Young Labour

IMPROVED atmosphere in the coalmining industry is reflected in Durham Divisional Coal Board's extension of juvenile recruitment. This extension comes at a time when industrialists, education authorities and others, concerned at the school-leaving "bulge," are discussing what can be done to provide more employment for juveniles. In the past few years, the intake of juveniles in the Durham division has been limited to 1,600. This year the target has been raised to 1,800, but this is not a "hard and fast" limit.

If a boy cannot be taken on at one colliery there are opportunities for him at other collieries nearby. Wages are good and compare favourably with other industries, while working conditions and welfare facilities are greatly improved on former days. With the development of mechanization, each new entrant is given a thorough training before commencing work underground.

County Switches Heating Policy in Favour of Coal

MINERS in Lanarkshire have persuaded the county council to reverse its policy of using oil for heating new buildings in favour of coal, gas, or electricity. Cllr. J. Russell, who moved at the council's Property Committee meeting that the policy should be reversed, said it had been decided on after a deputation from Lanarkshire branch of the National Union of Mineworkers had been heard. An important factor had been the decision to "freeze" the county's school-building programme. This had allowed them to look at the whole heating policy again, and wherever practicable, solid fuel, gas, or electricity would be used for heating purposes in all new county council buildings in preference to oil.

Cllr. Russell said he did not know if the oil system for the new 16-storey skyscraper block now being built in Hamilton as the council's headquarters would be scrapped. This would depend on how far the architect had progressed with the heating system plans.

PRESENTATIONS WERE made recently to Mr. Robert Gibson, deputy at Kingshill No. 2 Colliery, Central East Area, Scottish Divisional Coal Board, who has retired.

NEW SMOKELESS FUELS

NCB's Plans for 1,000,000 Tons Production

NEW smokeless fuels have reached the pilot plant stage in the Midlands and South Wales, and design work has been put in hand for commercial plants with a capacity of about 1,000,000 tons, Mr. J. S. Williams, NCB deputy director-general of marketing in charge of sales promotion, said last Friday. "We hope that within two or three years, the products of the first commercial plant will be reaching the market in quantity and by 1965, when other commercial plants will be increasing production, the output of these fuels will top the 1,000,000-ton mark."

Mr. Williams, who was speaking to the North-East Divisional Council of the National Society of Clean Air at Morpeth (Northumberland), said it was the declared policy of the board to give all possible support to the implementation of the Clean Air Act. Clean air was a challenge to the coal industry and an opportunity to demonstrate that coal was a modern fuel.

He reaffirmed the board's support for the orderly development of smoke control areas in line with the local availability of smokeless fuels. The Housewarming Plan was an aid to the purchase of modern appliances capable of burning smokeless fuels, and the first of the board's advisory Heat Service centres had been opened in Newcastle. All these were witnesses to the strength of the board's support for the Clean Air campaign.

Control in Industrial Plant

Dealing with smoke control in industrial plant by the use of mechanical stokers, Mr. Williams said that under the board's free technical advisory service, fuel technologists and stoker demonstrators had been able to show industrialists that the fitting of automatic stokers would not only result in freedom from worry about smoke emission but would give such improvements in efficiency that the stokers would probably pay for themselves within two years. The board was taking every possible step to see that the right type of fuel was available for mechanical firing, and since vesting day had spent over £50,000,000 on about 270 coal washeries, while another 60 were planned or under construction at an estimated cost of £35,000,000.

The British Coal Utilization Research Association and stoker and boiler manufacturers were carrying out development work to produce mechanically fired plant as cheap in capital cost as oil plant, and certainly cheaper in running costs. Investigation was being carried on into the completely automatic operation of plant, mechanical handling of coal and ash removal, and the development of the small chain grate stoker.

The board is making a two-fold contribution to increasing the supply of premium smokeless fuels for the open fire. Every effort will be made to provide the producers of premium fuels with the selected quantities of smokeless fuels. In the North, where there is little premium fuel available, if smoke control is to be extended there must be a drive to popularize the efficient and attractive openable stove, which can burn a wide range of smokeless fuels including Sunbrite hard coke.

It was a great disappointment to the board that local authorities, when making grants in smoke control areas, did not extend these grants to cover the purchase of heating stoves. Mr. Williams suggested as an alternative that householders should be encouraged on undertaking conversions connected with the establishment of smoke control areas, to purchase heating stoves through the board's Housewarming Plan and to use the grant they receive from the local authority as the first instalment.

In the central heating market, the board expects to market increased quantities of the naturally smokeless Welsh boiler fuels, Phurnacite, and Sunbrite hard coke, so that there should be an adequate supply of boiler fuels to meet the rapidly increasing demand.

Underground Stowing Urged to Improve Mines Safety

FURTHER consideration of underground stowing to improve safety in mines is urged by Mr. J. Davis, mines inspector, in the quarterly report of the Philadelphia and District Mines Inspection Board (Co. Durham). Mr. Davis says that underground stowing is not generally accepted, mainly because of the cost, but two pits in his area are using this system, and it is also practised in other parts of the country.

The present method of allowing workings on longwall faces to cave in, says Mr. Davis, could allow gas to accumulate in old workings with the risk of explosion caused by friction from falling rock. With the excellent machines now available, the stowing of old workings with materials normally tipped on the suface was a practical idea. This method would prevent the accumulation of gas in quantity and improve ventilation.

Six Bells Disaster Fund Closes at £102,000

CONTRIBUTIONS to the Six Bells Colliery Disaster Fund have reached a total of £102,457 and the fund has now closed. First payments to widows and dependants of the 45 miners who died in the disaster on June 29 last year, were made before Christmas and were retrospective to July 1.

The main points of the payment scheme agreed upon by the fund management committee are that widows should receive £90 a year, and children to the age of 16 years £67 10s. a year. Five adult dependants who are not widows have received £400 in full settlement, and £10,000 is reserved to assist with scholarships and grants for child beneficiaries who may wish to take further education or training after school.

Miners' Leader Warns on Production Lag

WARNING that the gap between demand and production of coal must be closed, Mr. S. W. G. Ford, president of the National Union of Mineworkers, said on Monday that once present coal stocks had been lifted the industry would have to rely on current production, and in the first quarter of this year this was 8,000,000 tons below consumption.

MR. S. W. G. FORD

Addressing the conference of the Midlands Area of the NUM at Stoke-on-Trent, he said that last year's production was just over 193,000,000 tons, but the way things were going this year it was likely to be 18,000,000 tons—far short of the 200,000,000 tons which the board had in mind for its demand target. He warned that the industry must do better than this if it was to avoid a recurrence of the difficulties which arose in the early 1950s when disappointed customers turned to alternative fuels because they could not obtain the supplies of coal required.

The broad aim of the union in the present circumstances, said Mr. Ford, was to seek some relief in respect of unfair financial burdens which the industry had been expected to carry since nationalization, and to seek Government action to ensure that the maximum use was made of coal—thus avoiding the development of circumstances in which the economy would become more and more reliant on imported fuel.

Mr. Arthur Baddeley, Area president, told the conference that pneumoconiosis was one of the greatest menaces which the industry now had to contend with. If the battle against the disease was to be won there was no room for laxity on anyone's part in the use of the various dust protection devices provided. While it might take a few years before the full benefits of dust suppression methods were reaped, he was convinced that most of those who began working in a mine since full suppression was adopted would be much less likely to contract the disease. The consequences of neglecting to suppress dust at all times, or hindering the use of various equipment to combat it, were serious.

Mr. H. A. Longden, chairman of the West Midlands Division of the NCB told the conference on Tuesday that the division still needed another 1,000 men. This year the rate of recruitment of juveniles had doubled, and the return of ex-miners had increased by 50 per cent. While there had been a substantial improvement in the rate of wastage in the last 12 months, the rate of improvement now showed a slight falling off.

Already this year face productivity had increased by 4.5 cwt. to 95 cwt. compared with last year. Overall production had also increased from 28.3 cwt. to 30 cwt.—the biggest single increase in overall productivity in any division this year. But 3,000,000 tons more coal a year was needed from the coalfield, which was blessed with some good seams.

Appointments

Pit Management Changes in North-Eastern NCB

TRANSFERS of three pit managers in the No. 5 Area of the North-Eastern Divisional Coal Board are announced. Mr. COLIN SHEPHERD, since 1957 manager of Wharncliffe Silkstone Colliery, has been appointed manager of Barrow Colliery. He is succeeded at Wharncliffe Silkstone by Mr. ALBERT JACQUES, who has been manager at Dodworth Colliery since 1954. Mr. NORMAN SCHOFIELD, manager of Barrow Colliery since last October, now becomes manager at Dodworth Colliery.

Mr. Colin Shepherd, who is 32, studied mining at Sheffield University, gaining an honours degree of B.Sc. mining, and later spent six months studying mechanized mining in Germany. Before his appointment at Wharncliffe Silkstone, he was undermanager at Skiers Spring Colliery.

Dr. ROGER A. BONES has joined Wayne Kerr Laboratories, Limited, as head of the contracts division.

Mr. L. WALKER has been appointed company chief inspector for the Plessey Company, Limited, group.

Mr. R. M. JENKINS has been appointed manager of the Midlands area office, Beacon Buildings, Aldridge, of Derby & Company, Limited.

Production manager of Leylands Motors, Limited, for many years, Mr. ARTHUR HOSKER has been appointed works manager of the company's headquarters factories.

Mr. MARK SEYMOUR, who is at present based at the main service centre at Stanningley, near Leeds, has been appointed parts manager for the J. I. Case Company, Limited, West Drayton (Middx).

Appointed as legal adviser to the British Electrical and Allied Manufacturers' Association, Mr. N. M. MISKIN, succeeds Mr. K. F. A. Johnston. He is at present with the Federation of British Industries and will take up his new appointment on May 1.

In place of Mr. C. Pritchett, in order to release him for other duties in technical management within the Chloride group, Mr. ALAN W. BAKER has been appointed general manager of Chloride Batteries, Limited. Mr. Baker joined the company as assistant general manager in 1959.

Mr. G. F. WARD, assistant manager at Littleton Colliery, Cannock Chase Area of the West Midlands Divisional Coal Board, has been appointed manager of Cannock Chase Colliery in the same Area. Mr. Ward is a former directed practical trainee and held managerial appointments at Brereton and Cannock Chase No. 3 collieries before going to Littleton.

ICI and Head Wrightson Link

PROBLEMS relating to the treatment of trade and other wastes before discharge into sewers or water-courses, will be dealt with under an arrangement that has been made between Head Wrightson Processes, Limited, and the "Alfloc" water treatment service of the alkali division of Imperial Chemical Industries, Limited.

In addition, a special study will be made of the re-use of water within industry with a view to alleviating problems of water supply and disposal of wastes.

In Parliament

RTB AND IRON-ORE INQUIRY

Procedure Not Defective, Says Lord Kilmuir

IN the House of Lords last Friday VISCOUNT KILMUIR, Lord Chancellor, rejected demands that the Council on Tribunals should investigate aspects of the Oxfordshire ironstone mining inquiry, and denied that the procedure at the inquiry had been defective. The inquiry, held last November, was into a proposal by Richard Thomas & Baldwins (Mineral Recoveries), Limited, to quarry iron ore south of Banbury for the £119,000,000 steelworks being built at Newport (Mon). Oxfordshire County Council headed the objectors.

In a written reply to Lord Lucas, who had called for an investigation into the inquiry in December, Lord Kilmuir said that there had been a suggestion that the Minister had been under pressure to grant permission because the company had already committed itself to considerable expenditure.

"There can be no question of the inspector's or the Minister's judgment being influenced by the company's admission that expenditure was incurred on plant partly designed for Oxfordshire ore before a decision was reached on their application; or by the statement made by counsel for the applicants that the Government had a financial interest in the parent company," he said.

Developer Aware of Risk

Lord Kilmuir said that the developer who embarked on expenditure in such circumstances had to be assumed to be aware of the risk. The developer had to decide how it presented its case, but no weight was given to such arguments in reaching a decision. In reply to Lord Lucas's suggestion that vital information necessary for the proper conduct of the objectors' case was withheld by the applicant, the parent company, and the Iron and Steel Board, he said it could not be held against an applicant if he decided there was a limit to the information he was prepared to give.

The applicant could not be required to elaborate his description of the proposed development before an inquiry opened by explaining the grounds on which the application was based. That was his task at the inquiry. "The view taken by the inspector will largely depend on the applicant's ability and willingness to justify his proposals." The company was told at the inquiry to provide plans showing the first 10 years' programme of its working and other particulars of its proposals. There was lengthy cross-examination on this extra information.

Lord Kilmuir went on: "So far as the applicant may be said to have failed in other aspects to support his generalizations at the inquiry by detailed evidence, this should be regarded not as depriving his opponents of an opportunity to attack him in cross-examination but as reducing his own chances of getting planning permission."

He said he could not accept that the procedure at the inquiry was defective because the inspector did not exercise his powers under the Local Government Act to call further witnesses. Referring to the applicants' offer to produce confidential figures of costs after the inquiry, he said: "The Minister would certainly not take account of new evidence in reaching his decision, unless an opportunity were afforded to the local planning authority for considering and commenting on it."

In his view, the inquiry procedure accorded fully with the policy adopted by the Government after the recommendations of the Franks Committee. He did not consider any circumstances had been disclosed which would justify a reference to the Council on Tribunals.

A Ministry spokesman said last Friday he could not say when the result of the inquiry would be known.

COLLIERY SPOIL HEAPS

WORKS for improving colliery spoil heaps by grass seeding, tree planting and grading, had been or were to be carried out in Cumberland, Durham, Lancashire, Northumberland and the West Riding, MR. HENRY BROOKE, Minister of Housing and Local Government, told MR. ROY MASON (Lab.), in a written answer. Works of improvement were also likely to be made by planning authorities in Kent, Leicestershire, Monmouthshire, Shropshire, Somerset, Warwickshire, Burnley and Stoke-on-Trent.

Other schemes of improvement, including tree-planting and reclamation, were being carried out by the National Coal Board, the Minister said, and as regards further assistance to local authorities his department was always ready with advice on how the problem might be tackled in particular cases. The Coal Board was co-operating with local planning authorities under the arrangements described in circular No. 26/59 and in other ways, and would continue to consider proposals for further schemes along these lines.

RTB ADVERTISING EXPENDITURE

ASKED by MR. CYRIL OSBORNE (Con.), about the conditions or limitations on expenditure on advertising by Richard Thomas & Baldwins, Limited, MR. ANTHONY BARBER, Economic Secretary to the Treasury, said the amount spent by the company on its own advertising was regarded as a matter of ordinary day-to-day company management, and was subject to no restriction or control either by the Treasury or the Iron and Steel Holding and Realization Agency.

MR. OSBORNE recalled that Mr. Michael Foot had

said in the House that he had information that such restrictions had been placed on the company by the Treasury, and asked if such information had been given to the Chancellor. MR. BARBER replied that nothing further had been heard from Mr. Foot about this suggestion. As far as he knew, there was no truth in what he had alleged.

SUPERVISORS FOR INDUSTRY

COMMITTEE to inquire into the training of supervisors in industry had been appointed, and was to hold its first meeting on Wednesday, MR. JOHN HARE, Minister of Labour, told MR. JOHN PAGE (Con.). The terms of reference of the committee were to review progress made and problems encountered in organizing effective training schemes, to consider arrangements for the selection of supervisors, and to examine whether there was a need for a central organization to further the development of supervisory training.

Membership of the committee includes:—Mr. J. R. Armstrong, British Association for Commercial and Industrial Education; Mr. D. B. Beynon, British Institute of Management; Mr. P. J. Casey and Mr. A. R. Duncan, British Employers' Confederation; Mr. C. D. Ellis, Institute of Personnel Management; Dr. C. B. Frisby, National Institute of Industrial Psychology, Mr. J. J. Henderson, Institute of Industrial Supervisors; Mr. A. Moffat, Industrial Welfare Society; Mr. R. D. V. Roberts, Nationalized Industries; Mr. J. P. Stoneman, Federation of British Industries; and Mr. D. Winnard, TUC.

Answering further questions from MR. PAGE, the MINISTER said he believed that good supervision could help to improve relations on the shop floor. As to Mr. Page's other point, that in some industries supervisors received less pay than those they were supposed to be supervising, employers would doubtless take note of what he had said.

ACCIDENTS IN STEEL INDUSTRY

CONCERN about the rate of accidents in the steel industry, particularly among younger workers, which reached a peak in the early part of 1960, was expressed by MR. E. L. MALLALIEU (Lab.). MR. JOHN HARE, Minister of Labour, said the industry had been particularly active in its efforts to reduce accidents. Between 1956 and 1959 the accident frequency rate for all workers fell by 27 per cent. and the rate for young people by 53 per cent.

Unfortunately, these rates showed increases in 1960 of 6 per cent. and 30 per cent. respectively, due in part to increasing activity and to the considerable influx of new workers. This was a disappointing reversal of the steady improvement previously achieved, but he was satisfied that the industry was intensifying its efforts to reduce the number of these accidents.

£1,500,000 Steel Mill Contract for Brightside

CONTRACT worth more than £1,500,000 has been awarded to the Brightside Foundry & Engineering Company, Limited, Sheffield, by London Works, Limited, a subsidiary of Duport, Limited, for the construction of a merchant bar mill.

The complete installation is scheduled to be in operation sometime in 1963 and will be the most modern of its type, producing more than 200,000 tons a year of finished products in straight lengths or coiled form.

SCOW Output Down in Last Six Months

DECREASES in output in nearly every sector during the last six months are shown by production figures published on Thursday of last week by the Steel Company of Wales, Limited. In three cases out of six, the figures were also down on those for the half-year ended March, 1960.

Output of steel ingots during the last 26 weeks totalled 1,354,000 tons, compared with 1,425,000 tons in the previous six months. During the half-year to March, 1960, steel ingot output totalled 1,352,000 tons, but the plant was then being operated continuously and to capacity. In the last half-year, due to the shortage of orders, the plant was unable to operate more economically. Tinplate production fell from 437,000 tons to 423,000 tons (454,000 tons in the half-year to March, 1960) while sheet output was down to 512,000 tons from 571,000 tons (542,000 tons a year earlier).

Plate production rose from 105,000 to 134,000 tons (89,000 tons a year earlier), but this large rise was not an encouraging feature from a financial point of view. It is understood that much of this tonnage was sold before it reached the final and most profitable strip mill stage. Moreover, there has been a marked drop in export prices.

Other figures in the report show that coke production fell from 782,000 tons to 732,000 tons during the half-year (712,000 tons in the period to March, 1960), and that pig-iron output dropped from 955,000 tons to 848,000 tons (963,000 tons). The directors intend to issue a statement of profit for the half-year to March, 1961, after the board meeting on June 8, at which the payment of an interim dividend will be considered.

HEAVIEST EVER ORDER-BOOK FOR R. W. CRABTREE

LARGEST order-book in its history is reported by Mr. Charles H. Crabtree, chairman of R. W. Crabtree & Sons, Limited, engineers and makers of printing machines, of Leeds, who adds that it has every appearance of growing larger. During 1960 production was not able to meet demand, but new plant is being built in Leeds and Gateshead to overcome capacity shortage. Very large orders had been obtained in the last few weeks from Canada and the US worth over £1,000,000.

Practically the whole of post-war exports, which have never been less than 50 per cent. of production, have been financed between the company and its customers. A number of orders have been lost, says Mr. Crabtree, because of inability to come to terms with the Export Credits Guarantee Department.

Liquid resources enabled provision of funds to meet the cost of new buildings and plant and to declare an increased dividend "without any strain on resources."

TWO MORE Clyde shipbuilding companies, Alexander Stephen & Sons, Limited, and the Fairfield Shipbuilding & Engineering Company, Limited, have had the rateable value of their yards increased. Rateable value of Stephen's has been increased eight times from £5,625 to £46,000, and Fairfield's has been increased nearly five times from £13,359 to £63,250.

PRODUCTION OF HIGH-SILICON STEELS by the Acid Open-hearth Process

by T. G. GREY-DAVIES

(Partridge, Jones & John Paton, Limited)

A practice for making steel for electrical sheet in acid open-hearth furnaces which has now become standard practice at the author's works is described in this article. The practice involves the use of calcium silicide to reduce sulphur contents to the low limits specified for this steel. Examples of desulphurization by calcium silicide additions to the furnace bath and ladle and to the ladle only are reported and discussed.

WITH the rapid growth of the electrical industry in the post-war years, there has been an increasing demand for electrical steel sheets for motors, dynamos, and transformers. The essential features of these steels are:—Low carbon, sulphur, phosphorus, and manganese contents, with silicon ranging from 0.3 to 4.3 per cent., depending on the particular application. Specifications for the higher grades of these steels are very rigid, which is not surprising, as the sheets are sold with guaranteed electrical properties. The demands on the steelmaker are, therefore, most exacting.

Sulphur is known to have a marked deleterious effect on these steels and the specifications place severe limits on its content in relation to the silicon content, *viz.*:—

Up to 0.5 per cent. silicon—0.050 per cent. sulphur maximum.

Up to 3.3 per cent. silicon—0.040 per cent. sulphur maximum.

Up to 4 per cent. silicon—0.015 per cent. sulphur maximum.

Carbon specifications call for 0.05 to 0.08 per cent. C in the cast state; in certain qualities the carbon is substantially lowered during subsequent processing.

In the early days when steelmaking specifications generally were less exacting, both acid and basic furnaces were operated in many South Wales plants. As specifications tightened, it became increasingly difficult to meet the carbon, sulphur, and phosphorus requirements for silicon steels in acid furnaces; consequently, the acid furnaces have been gradually replaced by basic furnaces. Fig. 1 shows the decline of acid steel production in South Wales since 1948.

During recent years, hematite pig-iron of extremely low sulphur and phosphorus contents has been difficult to obtain, and even when obtainable its price has had an adverse economic

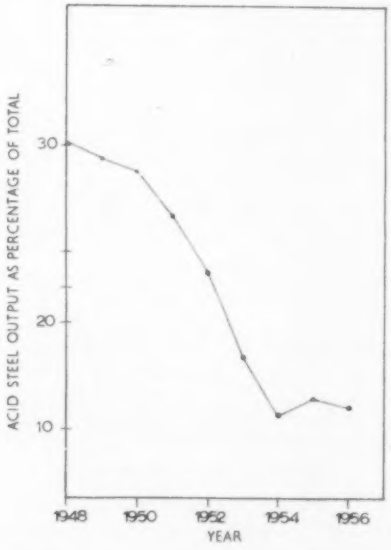

FIG. 1.—DECLINE OF ACID STEEL PRODUCTION IN SOUTH WALES.

TABLE 1.—*Acid Heat Illustrating Use of Silicon Steel Scrap.*

Time.	Details.				Metal samples—percentage analysis.					Slag Fe, per cent.
					C.	S.	P.	Mn.	Si.	
a.m.										
12.05	*Start charging*									
	Silicon steel shearings	Tons 19	Cwt. —	Qtr. —						
	Hematite pig-iron	5	10	—						
3.30	Light cuttings (scrap) five runs, each 3½ tons	17	10	—						
	Total charge	42	—	—						
6.30	Start ore feeds									
	Iron ore	—	4	—						
8.00	Bath boiling									
9.00	Sample				0.40	0.045	0.032			24.0
10.50	,,				0.09					23.0
11.20	,,				0.08					22.0
11.25	Lump Fe Si (45 to 50 per cent.) to bath	—	12	—						
11.50	Tapped									
	Pit samples: 1				0.09	0.047	0.032	0.24	0.516	
	2				0.09	0.047	0.033	0.24	0.518	
	3				0.09	0.047	0.033	0.24	0.518	

effect. The cessation of hematite iron production at Briton Ferry might virtually indicate the end of the acid process in South Wales.

Although the basic process now holds almost complete sway, it has certain disadvantages for the making of high-silicon steels, *e.g.*, tendencies to rephosphorization and to silicon losses during teeming. Thus in cold metal fixed furnace basic practice using a low-phosphorus iron, double-ladling, or other means are necessary to minimize these tendencies to phosphorus reversion and silicon loss in the later stages of teeming. Although there is little difficulty in achieving the silicon range in the lower grades of silicon steels, the loss of silicon when teeming in the presence of the oxidizing slag may amount to 0.2 per cent. silicon, and even greater if delays occur. Often when teeming in the presence of the phosphoric oxidizing slag, the last few ingots have to be rejected with, of course, adverse effect on yields.

One tapping practice entails taking away the ladle before the slag appears, but with sunken pits and drawn ladles this can be a "messy" procedure and the yields may be impaired through incomplete draining of metal from furnace to ladle.

With careful control, the acid process can be used for the making of these high-silicon steels and in certain circumstances it offers definite economic advantages. The following account of experiments in acid steelmaking for the production of electrical steels at the author's plant will doubtless be of interest to acid steelmakers, and possibly of general interest to all steelmakers.

DETAILS OF PRACTICE

Use of Silicon Steel Scrap

Increased production of silicon steels for the electrical industry has made available to the steelmaker greater amounts of silicon steel scrap. Its use in basic open-hearth furnaces needs careful control to prevent it causing hearth erosion, but it can be utilized with advantage in acid open-hearth furnaces as a replacement of part of the pig-iron normally required.

The typical heat record (Table 1) for one of the early dynamo-grade steels made by this practice illustrates this use of high-silicon steel scrap, and also, incidentally, of light press shop scrap.

The silicon steel scrap is charged first, followed by the pig-iron, and finally by the light scrap which is fed into the molten bath. The melt-out carbon is substantially equivalent to the amount of carbon charged, since the loss during melting is insignificant. Occasionally, when an excess of high-silicon steel scrap has been added inadvertently, high residual silicon on melting may retard the onset of boiling. Heavy additions of ore are inadvisable to avoid cutting the banks, and an injection burst of oxygen or compressed air for a few minutes quickly eliminates this residual silicon and brings the bath to the boil.

Additions of Finishing Alloys to the Furnace

A further marked advantage of this acid furnace practice which is shown in Table 1 and which applies to the higher grades of silicon steels is the excellent homogeneity, which results from the addition of the finishing alloys to the furnace. In the basic O-H process, additions of ferro-silicon to the furnace are not practicable; indeed, the ferro-silicon addition made to the ladle entails a substantial loss of silicon during teeming and, as already mentioned, double- and triple-ladle procedures are often used.

Use of Calcium Silicide for Desulphurization

The major problem in the production of high-silicon steels by the acid process is the stringent sulphur specification particularly for the high-silicon content grades. With the currently available raw materials and melting practice, some form of desulphurization treatment is required and since calcium silicide is known to effect desulphurization

TABLE 2.—*First Experimental Cast on Ladle Desulphurization with Calcium Silicide.*

Cast No.	C 193 (Experimental Cast 13).			
Charge				Tons
	Silicon steel shearings			15
	Spring scrap			10
	Press shop cuttings			7
	Hematite iron			7
				39
Furnace additions	Fe silicon (45 to 50 per cent.) 3,400 lb. (= 2.0 per cent. Si)			
Tapping sample	C, per cent.	S, per cent.	P, per cent.	
	0.08	0.049	0.030	
Ladle additions				lb.
	Fe-silicon (78 per cent.)			1,450
	Fe-manganese			280
	Aluminium			280
	Calcium silicide			1,100
Ladle samples Nine samples, one taken each fourth mould	C, per cent.	S, per cent.	Si, per cent.	Mn, per cent.
	0.07	0.029	3.6	0.28
	0.08	0.033	3.7	0.29
Casting observations	Vigorous initial reaction in ladle, settling down soon to normal behaviour			
Sulphur reduction	Bath		0.049 per cent.	
	Pit		0.031 per cent.	
			0.018 per cent.	

Therefore 1.6 lb. Ca Si/ton/0.001 per cent. S reduction.

of a fully-killed basic steel, its use in acid furnace practice has been investigated.

Ladle Additions of Calcium Silicide

The first experiments, made by adding calcium silicide to the metal in the ladle, produced spectacular results of a firework nature only; sulphur removal was nil. In further trials, contrary to the supplier's recommendations, lump-grade calcium silicide was placed in the ladle before the metal was added. As shown in Table 2, experimental cast 13 gave a marked sulphur reduction of 0.018 per cent., *i.e.*, 0.049 per cent. (bath)→0.031 per cent. (pit).

Details of the finishing treatment for a selection of other typical casts are given in Table 3. Since calcium silicide (Ca 33 to 36 per cent., Si 60 to 65 per cent.) is more expensive than ferro-silicon (78 to 83 per cent. Si), the amounts of calcium silicide used were regulated to provide ladle sulphur contents below the specification limit of 0.040 per cent. rather than as a means of adding silicon. The results achieved were satisfactory, but, with the exception of C 64 (a 3 per cent. silicon grade), did not quite approach the high efficiency of calcium silicide usage obtained in experimental cast 13. Incidentally, cast C 64 which was of higher silicon content than the remainder had the greatest sulphur reduction.

Since there is, on average, an increase of 0.003 per cent. sulphur between furnace and ladle due to contamination by sulphur picked up by the ladle lining during drying, the actual sulphur reductions by the calcium silicide treatment are greater than indicated in Tables 3 and 4.

TABLE 4.—*Furnace Desulphurization with Calcium Silicide.*

	Experimental Heat 2 (C 102).	Experimental Heat 3 (C 104).
Tapped weight, tons	42	46
Bath carbon, per cent.	0.09	0.09
Furnace additions:		
FeSi (45 to 50 per cent.), lb.	336	336
FeMn, lb.	60	—
Al, lb.	100	150
Bath sample:		
S, per cent.	0.048	0.045
Al, per cent.	0.075	0.066
Furnace additions:		
FeSi (45 to 50 per cent.), lb.	2,240	2,000
CaSi (in drums weighted with with FeMn), lb.	450	500
Bath sample (tapping):		
S, per cent.	0.044	0.039
Al, per cent.	0.030	0.022
Ladle additions:		
FeSi (78 per cent.), lb.	1,344	—
FeMn, lb.	40	—
Pit samples:		
C, per cent.	0.095	0.095
S, per cent.	0.043	0.038
P, per cent.	0.020	0.020
Mn, per cent.	0.28	0.29
Si, per cent.	2.06	2.44
Sulphur removal:		
Total, per cent.	0.005	0.007
CaSi requirement	1.85 lb. CaSi/ton/0.001 per cent. S	1.6 lb. CaSi/ton/0.001 per cent. S

TABLE 3.—*Ladle Desulphurization with Calcium Silicide.*

Cast No.	No. of ingots.	At tapping.		Additions to furnace bath.		Additions to ladle.			Pit sample percentage analysis.				
		Bath slag, total Fe.	Bath sulphur.	45/50 Fe Si.	Fe Mn.	78% Fe Si.	Al.	Calcium silicide.	C.	S.	P.	Mn.	Si.
				Cwt.	Lb.	Cwt.	Lb.	Lb.					
C 54	52	25.0	0.046	22	210	8	100	900	0.085	0.037	0.023	0.240	2.26
										Sulphur reduction 0.009			
C 59	49	24.0	0.049	24	190	8	200	900	0.085	0.041	0.020	0.270	2.43
										Sulphur reduction 0.008			
C 61	57	21.0	0.042	20	180	8	150	900	0.085	0.037	0.025	0.200	1.88
										Sulphur reduction 0.005			
C 62	55	19.0	0.044	30	180	8	200	700	0.085	0.038	0.031	0.250	2.37
										Sulphur reduction 0.006			
C 64	47	21.0	0.049	30	170	10½	250	1,080	0.085	0.035	0.023	0.220	3.0
										Sulphur reduction 0.014			

TABLE 5.—*Furnace and Ladle Desulphurization with Calcium Silicide. Cast* 168.

Charge	Tons Silicon steel shearings .. .. 17 Bundled scrap .. .. .. 19 Millom iron 7 43
Furnace condition	During refining, a bad bottom boil developed, the slag thickened and was chipped by heavy additions of limestone and dolomite
Bath sample	C 0.09 per cent. S 0.040 per cent.
Furnace additions	Ferro-silicon (45 to 50 per cent .. .. .. 3 cwt. Ferro-manganese .. .. 240 lb. followed by Aluminium .. .. 160 lb. Calcium silicide .. .. 900 lb. in weighted drums
Bath sample (at tapping 15 min. after additions)	S 0.038 per cent.
Ladle additions	Calcium silicide .. 900 lb. Ferro-silicon (75 to 80 per cent. .. .. .. 8 cwt.
Pit samples	C 0.09 per cent. S 0.027 per cent. Si 2.68 per cent. P 0.020 per cent. Mn 0.29 per cent.
Sulphur removal In furnace .. .. In ladle .. .. .. CaSi requirement ..	0.002 per cent. 0.011 per cent. 1.96 lb. CaSi/ton/0.001 per cent S.

Desulphurization by treatment in the ladle with calcium silicide is now a standard shop practice. The calcium silicide is placed in the ladle and covered completely by the ferro-silicon, followed by the aluminium. A fairly vigorous ladle reaction is obtained, but this soon settles down as pouring continues. In addition, other improvements in refining and tapping practice have been introduced. For example, mill scale for feeding purposes has been replaced by low-sulphur iron ore, ferro-silicon additions to the bath are completed 15 to 20 min. before tapping, and the metal is held in the ladle for 5 to 10 min. after the furnace has been drained.

Furnace Additions of Calcium Silicide

Experiments have also been made to study whether significant desulphurization could be achieved by furnace additions of calcium silicide to a deoxidized bath. The results indicate that while bath desulphurization is possible, its extent is influenced markedly by bath conditions, and is of a generally lower order than ladle desulphurization. This is not entirely unexpected.

In using calcium silicide in the furnace, the main problem would seem to be that of getting the addition through the slag into the metal. The low density of the alloy precludes direct shovelling into the furnace and other methods had to be tried. Eventually, successful additions of calcium silicide were made by putting it in drums which were weighted with ferro-manganese and charged from a "charging shoe." The first experiments were conducted carefully and precautions taken in case the reactions should prove too vigorous. In the event, the reactions were quite mild, apart from heavy emission of fume.

Details of the first two experiments are given in Table 4. Total sulphur reductions of 0.005 per cent. and 0.007 per cent., respectively, were obtained. These results were most encouraging.

Furnace and Ladle Additions of Calcium Silicide

Table 5 relates to an experimental cast (168) in which both furnace and ladle desulphurization were attempted, and it illustrates how furnace conditions can affect the measure of desulphurization achieved. This particular furnace was overdue for rebuilding and during refining a bad bottom boil developed, the slag thickened and was thinned by several additions of limestone and dolomite. The recorded bath desulphurization of 0.002 per cent. was disappointing in view of the relatively large addition of calcium silicide, but this probably resulted from incomplete deoxidation of the metal due to the bottom boil and the abnormally heavy slag bulk. Ladle desulphurization was, however, quite normal, *e.g.*, 0.011 per cent. S with a ladle addition of 900 lb. of calcium silicide.

Several other tests have been worked in this way with reasonable sulphur reductions, one of which is described in Table 6, which shows sulphur reductions of 0.003 per cent. and 0.004 per cent. in the furnace and ladle, respectively.

In order to obtain a measurable desulphurization in the furnace, it is believed that the slag must undergo deoxidation to some extent and that this

TABLE 6.—*Furnace and Ladle Desulphurization with Calcium Silicide Cast* C 249.

Charge	Tons Silicon steel shearings .. .. 15 Loose cuttings .. .. .. 17 Millom iron 6 38
Furnace condition	Slag kept thin by small additions of limestone
Bath sample	C, per cent. 0.08 — S, per cent. 0.044 — P, per cent. 0.032
Furnace additions	Ferro-silicon (45 to 50 per cent. .. .. .. 1,420 lb. Calcium silicide .. .. 900 lb. Aluminium .. .. 150 lb.
Bath sample (at tapping 15 min. later)	C, per cent. 0.069 — S, per cent. 0.041 — P, per cent. 0.033
Ladle additions	Calcium silicide .. .. 200 lb. Ferro-silicon (78 per cent.) 800 lb. L.C. ferro-manganese .. 230 lb.
Pit samples (range of four throughout teeming)	C, per cent. 0.084 / 0.092 — S, per cent. 0.037 — Si, per cent. 2.22 / 2.23 — Mn, per cent. 0.24
Sulphur removal In furnace .. .. In ladle .. .. CaSi requirement ..	0.003 per cent. 0.004 per cent. 1.3 lb. CaSi/ton/0.001 per cent. S.
Slag analyses	(1) Furnace slag before additions (per cent.): FeO 32.0 — SiO_2 52.6 — CaO 2.1 — S 0.014 (2) Furnace slag after additions (per cent.): FeO 24.2 — SiO_2 53.5 — CaO 9.3 — S 0.078

condition is achieved by the addition technique adopted. The " weighted " drums of calcium silicide float, partially submerged in the slag and metal, for a few minutes, and then rapidly disappear; the calcium silicide does not dissolve, therefore, directly in the metal and it is possible that some slag deoxidation is obtained. This is indicated by comparison of the two slag analyses in Table 6, which, incidentally, shows also the excellent homogeneity of the ladle metal.

Sulphur Specification of 0.015 per Cent.

Considerable past experience has confirmed that appreciable ladle desulphurization by treatment of the metal with aluminium and calcium silicide can be achieved in the acid process. The degree of desulphurization obtained is roughly proportional to the weight of calcium silicide added, *e.g.*, approx. 1.8 to 2.0 lb. CaSi/ton/0.001 per cent. S removed So far the main objective has been to achieve final sulphur content below 0.040 per cent., but several tests have been made which have approached sulphur levels of the order of 0.020 per cent.

It became of interest, therefore, to consider whether is would be possible to obtain sulphur values below 0.020 per cent. Indeed, the author always believed that this objective was attainable. Furnace treatment of slag and metal was therefore seriously considered, although it was realized that the greatest desuplhurization would be achieved by heavy additions of calcium silicide to the ladle. The absence in the ladle of a large proportion of the acid slag naturally favours the desulphurization effect of the calcium silicide treatment.

Permission was finally obtained to make a cast from the acid furnace to meet the following percentage specification:—C 0.070 max. S 0.015 P 0.030 max. Mn 0.150 max. Si 3.3 to 3.80.

Materials were chosen to give a bath sulphur around 0.030 per cent. and it was decided to bring this sulphur below 0.015 per cent. by desulphurization with calcium silicide in the ladle alone. A detailed account of this successful experimental cast is given in Table 7.

The ingots stripped from moulds quite easily and rolled well to sheets that were excellent in every way. There is little doubt that still heavier calcium silicide additions to a thoroughly deoxidized steel would give even greater sulphur reduction and that sulphur contents below 0.010 per cent. could be obtained if needed.

Discussion and Conclusions

The author hopes that this account of the use of the acid process for the making of silicon steels with stringent sulphur specifications will be of some practical interest to those concerned with such steels. Its advantages, *viz.*, the economic use of high-silicon steel scrap to replace acid pig-iron, the excellent homogeneity resulting from the ability to make substantial ferro-silicon additions to the furnace, coupled with the use of calcium silicide as a desulphurizer creates a flexibility that the acid process has not normally enjoyed.

The author believes that even in large, basic OH plants with substantial orders for silicon steels for electrical purposes, serious consideration could be given to the provision of an acid furnace in view of its economic and technical advantages for such steels.

It is well known that acid furnace charges melt and clear up much faster than those in the basic open-hearth and it may be reasonably anticipated that a modern acid-lined open-hearth furnace with oxygen for flame enrichment and oxygen available for decarburization could produce high-quality silicon steels to any required specification from 100 per cent. scrap charges at a higher production rate and lower cost than is usually achieved by the basic open-hearth furnace.

It is not hard to imagine any of the modern pneumatic processes with an acid lining producing this type of steel, using a high percentage of scrap, at very high production rates and very low cost. It should be noted that experiments on a 3-ton Kaldo vessel with an acid lining have shown that acid steelmaking by this oxygen process presents no difficulties and results in less lining wear than when operating with a basic lining.[1]

Acknowledgments

Acknowledgments are due to the directors of Partridge, Jones & John Paton, Limited, and Richard Thomas & Baldwins, Limited, for permission to publish this paper.

TABLE 7.—*Cast C209.*

Specification:
C, 0.070 per cent. max. Si, 3.3—3.8 per cent.
S, 0.015 per cent max. Mn, 0.150 per cent. max.

Furnace charge:

	T.	Cwt.	Qtr.
Silicon shearings (Si, 2.0 to 3.0 per cent.; S, average 0.025 per cent.)	12	9	0
Bundled steel cuttings (average: S, 0.030; P, 0.025 per cent.)	22	18	0
Scrap burden	35	7	0
Hematite pig-iron (average: S, 0.022 per cent; P, 0.023 per cent.)	3	16	0
Total weight charged	39	3	0

Working of charge:
Silicon shearings and pig-iron charged first, allowed to melt down and bundles added progressively until charge weight attained. Bath brought to boil with oxygen lance in bath.
First sample—C, 0.350 per cent.; S, 0.032 per cent; P, 0.030 per cent. Slag: Fe, 22.0 per cent.
Second sample—C, 0.080 per cent.; S, 0.033 per cent.
Third sample—C, 0.050 per cent.; S, 0.032 per cent. Bath temperature: 1,570 deg. C.
Only additions, 2 cwt. of limestone to maintain slag fluidity.

Additions to furnace bath:
45 — 50 per cent. ferro-silicon (shovelled in), 3,080 lb.
After final addition of ferro-silicon, gas was eased and bath allowed to stand 20 min. before tapping.

Additions to ladle:

Calcium silicide	1,136 lb.
Aluminium	400 lb.
78/80 ferro-silicon	1,232 lb.
Low-carbon ferro-manganese	70 lb.

Furnace tapped:
Tapping temperature, 1,570 deg. C.
Ladle reactions—Rather spectacular bright light and dense white fume. Metal quickly settled down and ladle was allowed to stand 10 min. before teeming commenced.

Teeming:
Temperature was not obtained owing to defect in instrument. Estimated 1,560 deg. C.
By the time half of the charge had been teemed, both nozzles were growing smaller. Cleaned with oxygen lance and gave no further trouble. Ingots stripped very easily. Approximate ingot weight, 17 cwt. 0.21 lb.; 43 ingots teemed, approximate weight, 37 tons.

Pit sample analyses:
Taken on first pair of ingots, 16th pair, and 19th pair.

Analyses checked at three works:

(*Continued overleaf*)

Average Values in Percentage

	C	Si	S	P	M
1st	0.065	3.57	0.014	0.030	0.135
16th	0.060	3.55	0.013	0.030	0.135
19th	0.060	3.55	0.014	0.030	0.135

Bath S, 0.032 per cent.; pit S, 0.014 per cent—equals 0.018 per cent. reduction of sulphur.

Calcium silicide addition 30.7 lb. per ton:

Assuming normal rise of sulphur between bath and pit of 0.003 per cent., then approximately 20 lb. of calcium silicide per ton reduces sulphur 0.010 per cent.

REFERENCE

[1] Bo Kalling, Folke Johansson, and Erik Bengtsson, Journal of Metals, July, 1960, p. 560.

Progress with Dunkirk Steel Plant

WORK is progressing rapidly on the 1,000-acre site on which USINOR's new Dunkirk steel plant is being built. After an initial period (started two years ago) during which heavy earth-moving equipment was busy outlining the main features of the plant and its private docks on the foreshore west of the town of Dunkirk, builders and engineers have taken over and the different parts of the works are now taking shape.

The programme, divided into two stages, provides for the building operations to be conducted as follows:—

First stage: Dwight-Lloyd sintering plant, a blast furnace of 28 ft. hearth diameter, expected to produce yearly 600,000 metric tons of pig-iron, two OLP converters of 140 tons capacity each, a slabbing mill, and a 4-high plate mill with finishing and heat-treatment line.

Second stage: A second blast furnace, another OLP converter, and a continuous strip mill (80 in.).

The two blast furnaces will use high top counter pressure and fuel injection. The foundations of the blast furnaces and the sintering plant are practically completed, and those of the steel melting shop and rolling mills also are well advanced. The plans provide for the first blast furnace to be blown in next year and the first delivery of steel plate to be made in the summer of 1962. Sheet deliveries will be made by the middle of 1963. Production capacity of the new plant should by then be about 1,500,000 metric tons of ingot steel, 300,000 tons of plate, and 800,000 tons of hot-rolled sheet.

Further developments are expected later, stretching out to 1968 and including additional blast furnaces and converters and a cold rolling mill. A 500-acre site is earmarked by the company for these developments.

NON-DESTRUCTIVE TESTING of welded tubing up to 16-in. dia. by the Farrowtest electro-magnetic induction method is announced by the Republic Steel Corporation, of Cleveland, Ohio. The Farrowtest method, widely used for many years on pipe and tube up to 4-in. dia., is now to be extended.

BRITISH ENGINEERING at Olympia

MORE than 500 exhibitors are occupying 275,000 sq. ft. of stand space at the Engineering, Marine, Welding, and Nuclear Energy Exhibition, which opened at Olympia, London, yesterday (Thursday). The exhibition continues until May 4.

Olympia's three main halls and their galleries are being used and the number of exhibitors has had to be restricted by space considerations.

The exhibition, which is held every two years, covers the whole field of mechanical engineering from boilers, furnaces, foundry equipment, generators, petrol and diesel engines, oil and gas engines, gas turbines, evaporators, cranes and heavy steelworks plant, to filters, gears, ball-bearings, piping, pumps and valves, transformers, tools and instruments.

In addition to the very large number of stands occupied by manufacturers of British equipment, there are many foreign exhibitors.

Cutting Steel Strip During Rolling

USE of an electronics device known as a digital lengthometer and tachometer is effecting savings in time and labour in cutting steel strip during rolling at the Vanderbilt Works of the South African Iron & Steel Industrial Corporation, Limited. According to Steel (January 23, 1961), the system also measures the speed of any one of six mill stands and displays the information above the shear controls in the operator's pulpit.

The lengthometer counts the revolutions of the flying shear motor and final stand, while the accuracy of the tachometer is ensured by timing the stand or shear motor speed with pulses generated by a crystal oscillator, the result being displayed as motor speed.

To the large number of count pulses generated by each revolution of the drive motor is attributed the accuracy of this device. A flat disc with a number of equally spaced holes is coupled to each motor by a step-up gear unit. As the disc rotates, the holes interrupt a light-source photocell arrangement generating about 5,000 cycles/sec. at normal running speed. Circuits which process the information permit swift direct reading at either the main control panel or the operator's pulpit.

CONTROL OF MINE VENTILATION

PART 2: EFFECTS OF CONCENTRATION OF OUTPUT

*by G. A. Percival, B.Sc.**

The need for ventilation planning to ensure that the future requirements of a mine are well within the capabilities of the ventilating fan is stressed in the second part of this paper, presented to the Midland Branch of the National Association of Colliery Managers on November 28, 1960. The use of booster fans is also described and the effects of rapidly advancing faces on gas emission discussed. The first part of the paper appeared in our last issue, p. 779.

IN the first part of this paper, consideration was given to the resistance opposing ventilation and a method of formulating the details of a resistance survey. From such a survey useful information relating to the resistance of existing roadways and their cross-sectional areas can be collected and used with advantage in assessing the future resistance of circuits.

In the case of newer fans, the initial, intermediate, and final duties of the fan are generally specified and, in many cases at collieries, where the resistance has increased and ventilation is insufficient at a particular fan speed, recourse has been made to the speeding up of the fan to give an immediate increase in flow, and little attention has been paid to reducing or controlling the resistance of the main roads or that of the system itself. Ultimately, in a few cases, the speed of the fan has been increased to its maximum, and therefore there is no margin left to accommodate the ventilation of future workings and the extra resistance that may be progressively added.

It is to be noted, however, that any mine fan is limited in its output, and if it operates at a constant maximum speed there is a definite and limited flow on a definite resistance. If this resistance is increased there will be a decrease in flow at a higher water gauge until the peak of the curve is reached. It follows, therefore, that if a definite quantity of air is required to give and maintain satisfactory ventilation when the faces are at the limit of working—and this includes leakage air, requirements for development work, and a certain margin for contingencies; there is thus a definite system resistance on which the fan must work and which should not be exceeded.

This figure of resistance is determined from the fan curve corresponding to its maximum speed. For the required quantity the corresponding water gauge can be found from the curve, and thus the corresponding system resistance. The process of main roadway enlargement and maintenance should follow a pattern through the years, such that the system resistance when the faces are approaching the limit of working is well within the scope of the fan.

* Ventilation engineer, No. 4 Area, East Midlands Divisional Coal Board.

Ventilation Planning

The plan referred to in the report of the National Consultative Council Sub-committee on Mining Explosions may, therefore, embody a combination of plans. Firstly, a plan on paper, indicating the extent of the workings, the proposed system of ventilation, the direction, number, and size of the main roads and airways and the proposed faces and output from the section or sections of the workings. The roadway sizes should be indicated and should be such that, in combination with the layout and system of working, the overall resistance of the system can be controlled to a value appropriate to the fan's potential when it operates at its maximum speed.

Secondly, a practical plan or policy to carry out the necessary work of roadway enlargement, or roadway duplication, and to control the resistances is assessed in that plan. If such control is not given to the system resistance, poor ventilation in part or parts of the mine will be inevitable and, where these conditions exist, there is encouragement for the layering of firedamp and the formation of accumulations of gas.

In such cases either the output may have to be reduced to the quantity of ventilation available or recourse made to the use of a booster fan. To increase the amount of air on a face situated a long distance from the shafts is practically an impossible task under normal conditions if the fan is operating at its maximum speed. The work

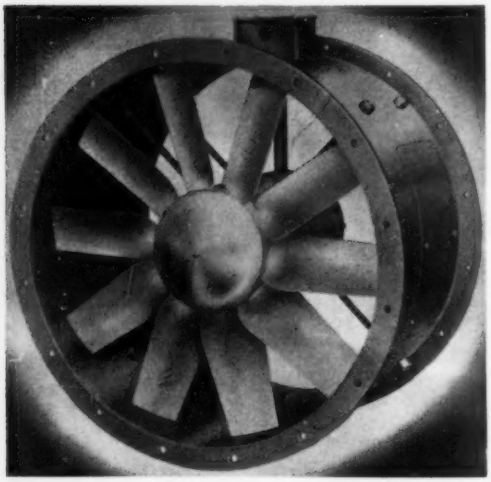

FIG. 9.—SINGLE-STAGE, 38-IN. DIA. AXIAL FLOW FAN.

of roadway enlargement and maintenance to a predetermined size may appear to be unnecessary at the time it is done, but preparation for the future ventilation has to be carried out in advance if it is desired to guarantee satisfactory ventilation when the faces are approaching the limit of working.

In cases where the system resistance has not been controlled and is in excess of that on which the fan can give the required quantity, the time taken to restore the position by enlarging the roadways or driving new ones may be considerable since the process of increasing the quantity by reducing the resistance is a slow one because $Q \propto \sqrt{\frac{I}{R}}$. Again, if the quantity is to be doubled, the resistance has to be reduced four times. Furthermore, the water gauge at the fan will be decreased as the system resistance decreases.

Booster Fans

The circumstances in which a booster fan may be used to advantage may be listed as follows:—(1) In cases where the surface fan is operating at its maximum speed and the ventilation is unsatisfactory as a temporary expedient while main road enlargement work is carried out. (2) In a split of high resistance in which the life is short and extensive roadway enlargement is not economically justified. In this case the output can be increased in an area distant from the shafts while a new area is developed.

The single-stage axial fan, direct coupled to an electric motor and housed in a cylinder, forms a unit, several of which can be grouped together in a series/parallel combination to form an installation which is flexible, reliable, and regarded as suitable for this work. Fig. 9 shows the single-stage unit which is 38 in. dia. direct coupled to its motor of 11 h.p. and designed to run at a speed of 1,490 r.p.m. The duty ranges from 20,000 cu. ft./min. at 2.5 in. water gauge to 30,000 cu. ft./min. on open circuit.

Units can be bolted together in series to give higher pressures, the second one is so designed to run in the opposite direction of rotation, thereby forming a contra-rotating combined unit. One two-stage unit would give from 16,000 to 30,000 cu. ft./min. with a water gauge from 1 in. to 7 in. Single- or multi-stage units can be arranged in parallel to give increased volume.

Two two-stage units in parallel would give outputs between 30,000 cu. ft./min. at 7.5 in. water gauge and 60,000 cu. ft./min. at 0.5 in. water gauge, depending on the split resistance.

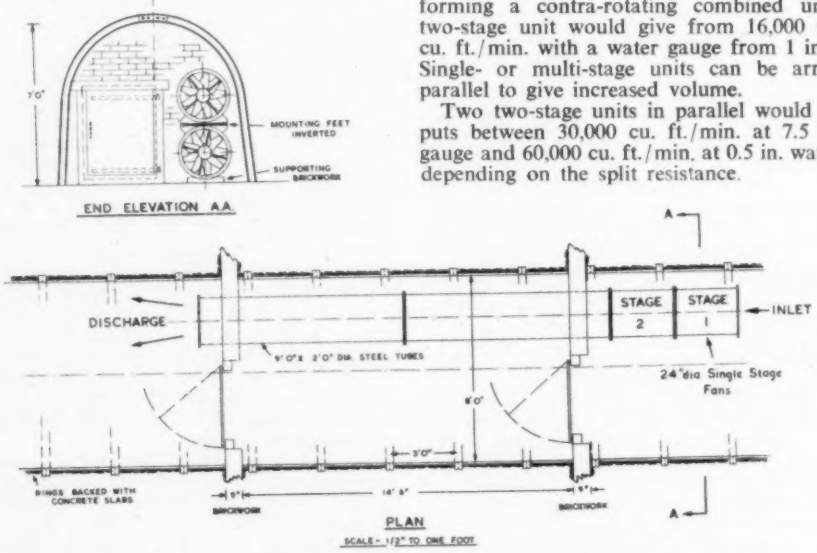

FIG. 10.—TYPICAL BOOSTER FAN LAYOUT FOR TWO TWO-STAGE UNITS IN PARALLEL.

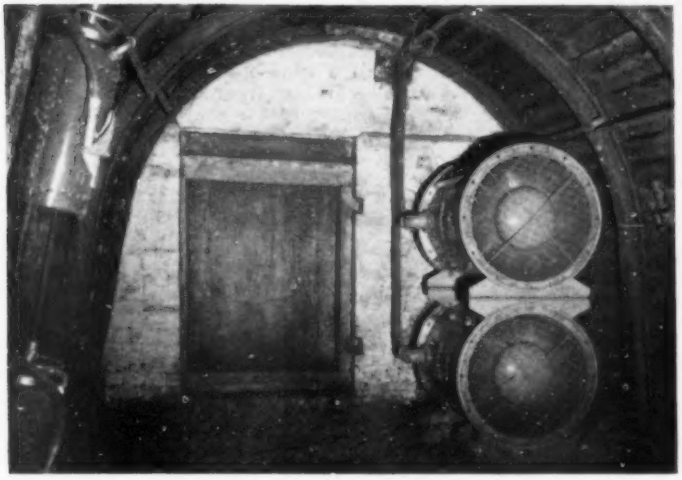

FIG. 11.—INSTALLATION OF TWO SINGLE-STAGE, 24-IN. DIA. FANS.

Fig. 10 shows the layout of 24-in. dia. fans and Figs. 11 and 12 show views of both 24-in. and 38-in. installations. A particular advantage derived from one installation, comprising three two-stage units delivering 65,000 cu. ft./min. at 4.8-in. water gauge is the reduction in leakage on the discharge side of the fan. Normally, without the booster, the leakage is 30,000 cu. ft./min. since the water gauge through the pit-bottom separation doors is 7.1 in. With the fan in operation, the leakage is reduced to 5,000 cu. ft./min. (Fig. 13). The flow at the site of the fan when it is not operating is 33,000 cu. ft./min., and with the fan working the flow is 65,000 cu. ft./min.

Gas Emission and Rate of Advance of Faces

One of the significant features resulting from concentration of workings and mechanization in coal mining is the concentration of gas emission to a smaller area of workings. Numerous opinions have been expressed as to the actual origin of gas emission, one view being that it is emitted from the particular seam being worked; another view is that it is emitted from coal seams above the seam being worked.

The most popular view, however, is that it is given off from the strata above and below the seam being worked and is emitted through induced breaks in the strata created by working. It appears certain that since firedamp is lighter than air any open joints or breaks in the strata above the goaf and behind the face will be full of the gas or of a firedamp/air mixture. Some doubt is thus created as to the exact origin of the emission. The zone of strata from which emission takes place is, in general, immediately behind the face from the area of strata which is under the influence of subsidence. At a certain distance from the face where subsidence is complete gas emission is much less or ceases altogether.

An investigation into the possible relationship between gas emission and rate of advance of the face was made in the workings of the Deep Hard Seam at two collieries. The seam was 760 yd. deep where the faces were being worked and the seam was 3 ft. 3 in. thick.

The faces undergoing tests were:—(*a*) conventional faces 200 yd. long, on which the coal was cut by machine and hand filled onto conveyors, with a system of strip packing in operation using 3-yd. packs and 7-yd. wastes; (*b*) shearer faces, also 200 yd. long, on which the coal was power-loaded and where the goaf was totally caved between the gate-side packs. The rate of advance in the case of the conventional faces was 8 yd. per week and that of the shearer faces was 13 to 14 yd./week. Air sampling was carried out at hourly intervals on each shift over a period of six weeks and air quantity readings taken twice per shift.

The results showed that at No. 1 Colliery the make of gas varied between 55.6 and 84.9 cu. ft./

FIG. 12.—DISCHARGE SIDE OF TWO, TWO-STAGE, 38-IN. DIA. FANS.

min. on the faces, which advanced at a rate of 8 yd./week, while on shearer faces the make of gas varied between 129.9 and 209.6 cu. ft./min. where the advance was 13 to 14 yd./week. At No. 2 Colliery, on a conventional face, the make varied between 34.4 and 46.3 cu. ft./min. when the advance was 4.66 yd./week. On the shearer face the make varied between 136.2 and 179.4 cu. ft./min. where the advance was 14.6 yd./week. There appears, therefore, some relationship between gas emission and rate of advance of the face.

Another significant conclusion arrived at from this investigation was that the amount of open goaf or area of disturbed ground existing behind faces varied in accordance with the rate of advance. In the case of a conventional face travelling at 8 yd./week the distance from the face to the point of complete closure of the goaf was between 250 and 300 yd., while in the case of a shearer face, advancing at a rate of 14.5 yd./week, the distance was between 500 and 600 yd., indicating that there may be a void behind such shearer faces of twice the volume of that behind a conventional face where strip packing is in operation.

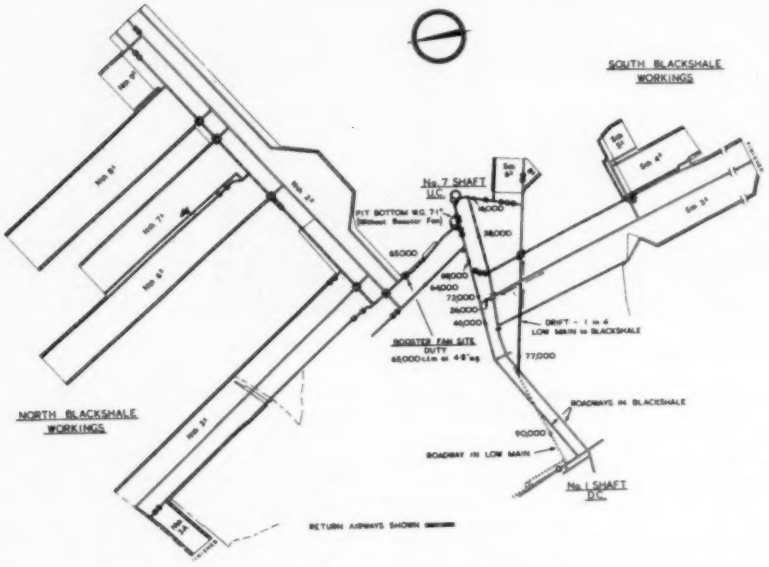

FIG. 13.—LAYOUT OF THE MINE WORKINGS SHOWING THE SITE OF A BOOSTER FAN CONSISTING OF THREE TWO-STAGE UNITS.

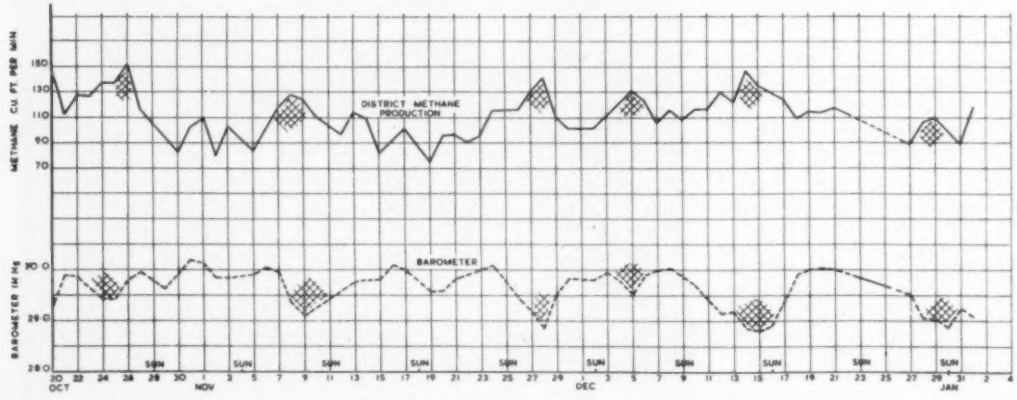

FIG. 14.—BAROMETRIC VARIATION AND METHANE PRODUCTION IN CU. FT./MIN. AT A SHEARER FACE IN THE DEEP HARD SEAM.

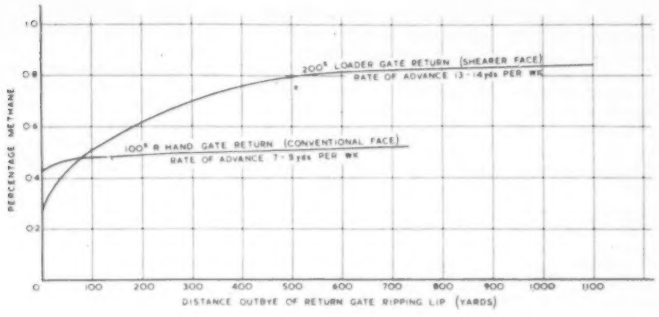

FIG. 15.—GAS CONTENT IN RELATION TO THE DISTANCE FROM FACES WORKED BY CONVENTIONAL METHODS AND AN ANDERTON SHEARER.

The effect of a serious drop in barometric pressure of, say, 0.3 in. Hg in 3 hr. would have a much more pronounced effect on gas issue from the goaf in the case of rapidly advancing faces (Fig. 14). There also appears to be a greater emission of gas through the packs into the return gate in the case of shearer faces where the advance is rapid, and tests taken in both cases (conventional and shearer) of the build up of gas in return gates were made by taking air samples at intervals of 10 yd. throughout the return gates.

Fig. 15 shows the graphs of the two cases in which firedamp percentage is plotted against distance from the face. It appears from these features that the amount of gas emission is proportional to the area of subsiding ground immediately behind the working face and this varies with the rate of advance of the face. In further research in this work the strata control specialist may be able to make a valuable contribution towards obtaining some definite knowledge of the subject.

Conclusions

The causes of unsatisfactory general ventilation in mines can, in most cases, be attributed to the system resistance being too large for the fan to give the required quantity of air when operating at its maximum speed. If a fan operates at its maximum speed the flow created is limited by the system resistance and if an increase in flow is required it can only be made by reducing this resistance or by the application of a booster fan.

To control mine ventilation it is essential to control the system resistance through the life of the mine or seam in such a way that when the workings are most distant from the shafts it is well within the capacity of the fan to give the required quantity when operating at its maximum speed, allowing a margin for contingencies. The control of the system resistance is vitally essential with the present methods of working, since the resultants of intense concentration and mechanization are a higher density of manpower in certain parts of the mine, increased rate of gas emission, greater possibility of gas layering, and a more intense effect of barometric pressure changes on the exudation of gas from the goaf.

A plan as suggested in the report of the National Consultative Council Sub-committee should therefore, be formulated with a view to controlling the system resistance to ensure and guarantee continuous satisfactory ventilation throughout the life of the mine or seam. This can be formulated from a knowledge of the output required, the extent of the area to be worked, the system of working and of ventilation, and by the execution of practical work in enlarging and maintaining main airways to predetermined sizes conforming to preassessed section resistances.

The risk of using a booster fan may in many cases be less than that in tolerating poor ventilation and the consequent increase in the possibility of gas layering and in the formation of accumulations of gas. Under normal conditions there is no treatment which will give immediate relief or any spectacular increase in flow when poor ventilation exists with the fan operating at its maximum speed.

The author is no advocate of the use of booster fans, but if there is no alternative to give immediate relief then it should have no prejudices. At the same time immediate steps should be taken to reduce the split resistance to promote conditions for its being dispensed with.

The size of a mine fan for a particular mine is limited to the size of the shafts and the maximum tolerable velocity of the air in the shafts. Furthermore, the maximum resistance which can then be tolerated is governed by the maximum water gauge which can be used in the system without discomfort.

To reduce the possibility of gas layering in thin seams with high gas emission rates it may be beneficial to limit the total advance of any face and reduce the size of the face airways so that the velocity in the roadways does not fall below 200 ft./min. The effect on the total system resistance would be small, due to the relatively small quantities involved. The use of adjacent intakes or returns (neutral gates) in the ventilation of double-unit faces should be avoided at all costs.

The author wishes to thank the National Coal Board, Mr. F. D. Severn, Area general manager, and Mr. J. A. Wright, Area production manager, No. 4 Area, East Midlands Divisional Coal Board, for permission to prepare and present this paper. For assistance in its compilation thanks are conveyed to the members of the staff of the ventilation, scientific, printing, and typing departments of No. 4 Area, and to Davidson & Company, Limited, Aerex, Limited, and Woods of Colchester, Limited, for the use of information relating to fans. The opinions expressed are those of the author and not necessarily those of the NCB.

DISCUSSION

MR. T. R. JAMESON, branch president, opening the discussion, asked whether it was better to arrange parallel airways if possible or to use a booster fan while carrying out enlargements.

The AUTHOR stated that the process of roadway enlargement and paralleling airways wherever possible should be a continuous and planned process in order to control the system resistance and thus to ensure satisfactory future ventilation. If such control was not maintained then the use of a booster fan became necessary if the surface fan could not be speeded up to give the requirements. Any paralleling of main airways and roadway enlargement carried out after the installation of the booster fan would affect the fan by increasing automatically its quantity and reducing the water gauge, and a stage would be reached when it could be taken out.

MR. JAMESON also asked if the author considered it necessary to run booster fans or auxiliary fans, or both, at weekends or holiday times when normally no other workmen would be in the pit.

The necessity of having to run booster fans at weekends or holiday times, replied the AUTHOR, depended on the conditions of ventilation produced when the booster was not operating. If conditions were such that Section 55 of the Act was fully satisfied then the fans need not be run. In cases where they were required to be run they should be fully manned. In the case of the use of auxiliary fans Section 55 should again be fully satisfied at all times.

Location of Booster Fan

MR. W. MORRELL asked what factors were taken into consideration when deciding the location of the booster fan. Replying, the AUTHOR said, in deciding the point of location of the fan, consideration was given to the quantity of air already flowing at the point and the increase in flow required to be made by the fan. This should be such that it was well within the scope of the fan, keeping in mind that the extra water gauge required varied as the square of the original and future quantities.

The effect of increased leakage inbye of the fan and of decreased leakage outbye of the fan was also taken into account. An assessment was made of the change in the pressure distribution within the system with the fan in operation and from this an estimate of the leakage was made.

Asked by MR. P. HALLAM what was the permissible error when totalling the increments in a pressure survey, the AUTHOR replied that, in relatively flat seams, the permissible error might be in the region of 0.025 in. water guage per mile of the pressure survey traverse. Since the majority of ventilation systems involved gradients and the use of drifts, there was always some error introduced into the system by the natural ventilation effect and by changes in air density.

MR. J. L. COLLINSON asked if the author could give an indication of the annual cost of producing, say, 150,000 cu. ft./min. at 7 in. water guage, and if he could compare this with the annual cost that would have to be borne to produce 200,000 cu ft./min., by speeding up the fan. He himself felt that this figure would be interesting to managers as they would see that a considerable amount of roadway enlargement could be done for the same sum.

The AUTHOR stated that the annual power cost of producing a quantity of 150,000 cu. ft./min. at 7 in. water gauge, assuming an overall efficiency of 65 per cent., would be approximately 15s. 10d./hr. or £6,935 per year. To produce 200,000 cu. ft./min., the speed of the fan would have to be increased by 33 per cent. and since the power input to the fan varies as the cube of the speed. The power cost would be increased 2.37 times to £16,435 per annum, equivalent to a net increase of £9,500 per annum. This would pay for 475 yd. of roadway enlargement costing, say, £20/yd. In the calculation, the benefit of improved power factor by the use of a synchronous motor was not taken into account.

MR. H. F. WATSON said the type of booster fans at present in use required return air to pass through them and it was possible to envisage conditions in return air where the power might have to be discontinued due to gas content. He wondered if the author had any ideas of using booster fans in intake airways.

In reply, the AUTHOR said that in most of the cases with which he had been associated gas emission had been small and the booster fans had been placed in the main split return airways a long distance from the faces. In all cases the gas percentage was reduced by leakage at points inbye of the fan.

In collieries where gas emission was very high there was the possibility that it would be impracticable to use a booster sited in the returns. Such boosters could be used in intake airways in which belts were installed, but their efficiency and effectiveness depended on the tightness of the seals between the suction and discharge sides of the fans and which would, however, have to be built over the belts. There was no reason, however, why they should not be installed in intake airways in which belts were installed, provided the seals or separation doors were well made and well maintained.

MR. R. E. WEBB, referring to mention in the paper of gas emission being related to rate of advance, quoted a case where, for roof control reasons, he had to revert from caving to strip packing. This had resulted in a marked decrease in the rate of gas emission and he wondered whether this agreed with the author's experience.

The AUTHOR said that, from his experience, with caving and strip packing there appeared to be a higher rate of gas emission with caving than with strip packing. This was no doubt due to the more intense subsidence when caving and the exposure of more broken strata from which gas was emitted. The results of the experience of the author agreed with those submitted by Mr. Webb.

Pressure Surveys

MR. M. W. FLETCHER suggested that the introduction of booster fans needed a cautious approach and asked if it was not first necessary to make a pressure survey and submit the results to the Inspectorate.

Before the fans were installed, replied the AUTHOR, pressure surveys were made of the districts likely to be affected by the installation, and the required detail and reports were forwarded to the Inspectorate in accordance with the Ventilation Regulations.

MR. FLETCHER also said that where reference was made to a booster fan warning light system, he wondered whether the fan was continually manned and whether a water gauge was fitted. Replying, the AUTHOR said in the case of one booster fan installation, a warning light operated by a pressure vane, gave an indication at the surface when the fan was not running. All fans were manned on all shifts and at all installations both an automatic pressure recorder and an ordinary water gauge were fitted as standard equipment.

In all cases the roadway for 40 yd. both inbye and outbye of the fan, and any wooden doors were fireproofed. However, wooden doors were being replaced by steel doors. In most of the calculations a check was made by using a calculator. Generally, the estimate of the new flow was very close to that actually measured in practice.

With reference to higher water gauges being required there was the trend for these to increase due to concentration in workings and the more rapid rate of

advance of faces, which, in turn, tended to increase the gas emission. There was, therefore, the necessity for the use of the maximum amount of air on faces, and, in consequence, the need to pass large volumes through systems of higher resistance.

MR. P. SAVAGE wondered if all types of fans had been considered before choosing the type indicated and what had determined the preference shown.

In the installation mentioned, replied the AUTHOR, various types of fans were considered, and the particular ones which were of the axial type had been decided on because of their compactness, flexibility, and adaptability.

MR. L. F. M. ACKROYD asked if any information was available as to the resistance created by obstacles such as transfer chutes, dust barriers, etc.

The AUTHOR replied that such equipment certainly offered considerable resistance to ventilation in the same way that a main road conveyor installed in a road increased the resistance. Such a figure depended on the area of the road available for air flow. At a transfer point, the resistance of the road for a length of 4 to 5 yd. might be increased five or six times, depending on the size of the equipment installed. At such places the road should be enlarged to allow for a free air flow.

MODIFICATIONS TO *Self-advancing Roof Support*

DURING its five years' operation on longwall coal faces in this and other countries, the Roofmaster has proved itself to be a reliable, safe, and efficient mine support system. In the light of this experience, Dowty Mining Equipment, Limited, Ashchurch (Glos), has introduced certain design improvements for easier maintenance, greater protection for valves, and improved manoeuvring space for operators. These changes in no way affect the function and operation of the system; physically, the design remains substantially the same.

The prop control valve, which on the Mark I Roofmaster is mounted on the bottom beam immediately behind the first prop, is now located underneath the top beam, the props being pressure fed by flexible hose run within the web of the top beam. Connection from the jack to the prop control valve is also by flexible hose. Because the pressure line is fed to the top of the prop, a stack pipe has been utilized which directs the pressure oil to the underside of the piston.

Locating the prop control valve in the top beam has enabled the designer to dispense with the rigid pipes and protective covers which, in the original Roofmaster, were situated on the bottom beam. Full protection to valve and hoses is provided by the top beam.

Maintenance is simplified, as, in this new position, valves and hoses are readily accessible and, should the necessity arise, quickly changed. The absence of the control valve block on the bottom beam provides a better travelling way between units, as can be seen from Fig. 1. These changes have effected a saving in material and in manufacturing costs, thus enabling the manufacturer to reduce the price of the system.

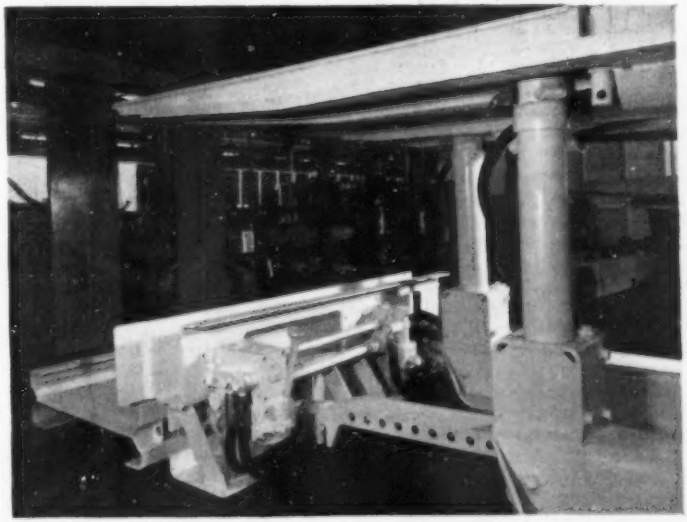

FIG. 1.—MODIFIED DOWTY ROOFMASTER WITH PRESSURE LINES AND PROP-CONTROL VALVE MOUNTED BENEATH THE ROOF BEAM.

EXPORTS OF IRON ORE from Venezuela last year amounted to 19,500,000 tons (17,000,000 tons in 1959). Of this total, 15,000,000 tons, representing 42.8 per cent. of US iron-ore imports, were shipped to the United States. The Orinoco Mining Company, the Bank of London & South America reports, is to reduce its iron-ore output by more than 4,000,000 tons, or 25 per cent., this year, because of the fall in demand for steel, particularly in the United States.

Forthcoming Events

APRIL 24

Institution of Plant Engineers (West and East Yorkshire Branch):—Meeting at the Houldsworth School of Applied Science, Leeds University, at 7.30 p.m. "The Introduction of Planned Maintenance Systems," by A. F. Stedman.

Institution of Chemical Engineers:—Meeting of the British Nuclear Energy Conference, sponsored by the institution, at the Federation of British Industries, 21, Tothill Street, London, S.W.1, at 5.30 p.m. "The Development of Fluid Fuel Reactors," by A. M. Weinberg. Visitors are invited to attend.

APRIL 25

Society of Instrument Technology:—Meeting at Manson House, 26, Portland Place, London, W.1, at 7 p.m. "Instrumentation in the Iron and Steel Industry," by A. H. Pople.

Institution of Plant Engineers (South Wales Branch):—Meeting at the South Wales Institute of Engineers, Park Place, Cardiff, at 7.30 p.m. "Fuel Efficiency," by W. Short.

Institution of Mechanical Engineers (Midland Branch):—Meeting at the Hotel Leofric, Coventry, at 7.15 p.m. "Forty-five Years of Mechanical Handling," by E. Bealing.

Institution of Mechanical Engineers (North Ireland Branch):—Meeting at the Central Hall, Belfast College of Technology, at 6.45 p.m. "Engineering Dimensional Metrology as an Aid to Engineering Production," by Prof. J. Loxham.

APRIL 26

Swansea College of Technology Mining Society:—Meeting at the college at 6.30 p.m. "Economics of the Coal Industry," by G. F. MacRobie, economic adviser, National Coal Board.

Royal Society of Arts:—Meeting at John Adam Street, Adelphi, London, W.C.2, at 2.30 p.m. Trueman Wood Lecture: "The Training of Scientists for Industry," by Sir John Cockcroft, FRS.

Institution of Plant Engineers (Leicester Branch):—Meeting at the Midland Hotel, Leicester, at 7.30 p.m. "Mechanical Handling," by N. A. L. Thorne.

APRIL 27

Institution of Production Engineers (Lincoln Section):—Meeting at the Ruston Club, Lincoln, at 7.30 p.m. "Some Aspects of Production Engineering," by L. R. Mumford.

Institution of Plant Engineers (Merseyside and North Wales Branch):—Meeting at the Blossoms Hotel, Chester, at 7.15 p.m. "Problems Associated with the Running of a General Engineering Works," by C. J. Wright.

Institution of Plant Engineers (North East Branch):—Meeting at the Cleveland Scientific and Technical Institution, Corporation Road, Middlesbrough, at 7 p.m. "Lubrication of I.C. Engines for Minimum Wear," by H. Middleditch, assistant Area mechanical engineer, No. 2 Area, Durham Divisional Coal Board.

Institution of Plant Engineers (Sheffield and District Branch):—Meeting at the Grand Hotel, Sheffield, at 7.30 p.m. "Portable and Stationary Compressors," by C. A. F. Mackintosh.

Institute of Marine Engineers (West Midlands Section):—Meeting at the Engineering Centre, Birmingham, at 7 p.m. "The History and Development of Air and Gas Compressing Plants," by M. J. Waldon.

MAY 1

Institute of British Foundrymen (Sheffield Branch):—Annual general meeting at the Technical College, Pond Street, Sheffield, at 7 p.m., followed by discussion on foundry topics.

National Association of Colliery Managers

APRIL 26

Lancashire Branch:—Meeting at 40, Portland Street, Manchester. "The Application of Fluid Drives in the Mining Industry," by E. C. Farrer, director, Fluidrive Engineering Company, Limited.

APRIL 27

South Staffordshire, Warwickshire, Worcestershire and Shropshire Branch:—Visit to Bretby Central Engineering Establishment.

APRIL 28

Kent Branch:—Annual dinner and dance at the County Hotel, Canterbury.

RELINING OF No. 2 BLAST FURNACE AT CONSETT

AT 7.30 a.m. on Monday of last week the demolition of the lining of No. 2 blast furnace at the works of Consett Iron Company, Limited, Consett (Co. Durham), commenced. The furnace, which is 85 ft. high and has a hearth diameter of 20 ft. 9 in., has a lining of special quality firebrick 3 ft. thick and stands on a 12-ft. thick brick hearth pad built on a concrete raft.

Before the actual demolition operation commenced the furnace had to be taken off blast and filled with a special blow-out material. The bottom 22 ft. of the furnace contained incandescent coke and this, together with the furnace lining, which, in parts, had a temperature of 1,400 deg. C., had to be quenched. To do this over 1,000,000 gal. of water were pumped in during a period of two days and this quenching had to be very carefully controlled to avoid any explosion.

The demolition, which is being done by Grant-Lyon & Company, Limited, Scunthorpe, will involve the removal of over 1,000 tons of quenched coke and iron ore and 1,300 tons of firebrick and a mass of fused brick and iron from inside the furnace. It will necessitate firing about 250 lb. of explosives. Chipping away of the old lining will start at the top of the furnace and will be done by men working from a swinging stage. Using modern mechanical methods, it is expected that removal of the lining will be completed in about three weeks, working 24 hr. a day. As soon as the top half of the lining has been removed and while blasting is still proceeding in the bottom, re-bricking will commence halfway up the furnace, thus saving valuable time. The re-bricking, which is a highly specialized operation, will be carried out by Tattersall & Sons, Limited, Middlesbrough, and is expected to take between 35 and 40 days, during which time about 500,000 bricks will be laid.

While the demolition work and re-bricking is taking place the charging and operating equipment will be removed, lowered to the ground, overhauled, and replaced so that the furnace is ready again in about two months.

THE BRITISH STANDARDS INSTITUTION proposes to withdraw BS 32:1952, "Steel Bars for the Production of Machined Parts," the information being now incorporated in BS 970:1955, "Wrought Steels."

BISRA STEELMAKING CONFERENCE

Recent Developments in

The Physical Chemistry of SLAG/METAL PROCESSES

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This is a shortened version of the third paper presented at the 55th BISRA Steelmaking Conference, held at Harrogate on October 12 and 13, 1960. The two earlier papers were published in our issues of November 18 and December 30.

RAPID developments are taking place in steel production methods. This gives physical chemistry of slag/metal processes more chance to be of direct use to the industry in process development. But to be useful the accuracy of physico-chemical research results must keep pace with rising process efficiency: for example, Bessemer would have welcomed even the crudest data on the dephosphorizing power of slags, but the modern operator, already dephosphorizing adequately, needs precise information. This, and the fact that more and more elements are becoming involved in steelmaking, has led to a rapid growth in the amount of physico-chemical research reports relevant to the subject of this paper. Even if "recent" is taken to mean three years, something like 300 papers would be involved.

Therefore, only broad trends can be covered, but the attempt will be made to trace the aims and backgrounds of the main lines of recent work, and to give some idea of theoretical and experimental considerations. Most determinations in slag/metal process physical chemistry are easy in principle, but difficult in practice, and little space has been devoted to them.

The first two parts of this paper deal with reaction thermochemistry, that is, work aimed basically at finding whether processes are possible, in the sense that it is possible for things to fall down but not up. The third part deals with the speed at which processes occur, a more complicated matter. Researches not falling wholly into any one of these categories are considered in the last part.

I.—THERMOCHEMISTRY

Thermochemistry, also known as chemical thermodynamics, deals mainly with the energy changes when substances pass from some known state to another—and especially when the second state is equilibrium. If useful work can be obtained—in other words, if the free energy decreases—the process is possible in the sense of the previous paragraph; if the free-energy increases it is not possible; if the free-energy remains unchanged the two states would be in equilibrium.

Recent developments in free-energy investigations are conveniently considered on the basis of the following three usual ways of determining the free-energy decrease.

(a) Free-energy Decrease from the Equilibrium Constant

At a given temperature the free-energy decrease for standard initial and final states of the substances participating in the process is the product of the gas constant and the logarithm of the equilibrium constant. So, by finding the equilibrium constant we can find the so-called standard free-energy change. The usefulness of this function has been described in detail; for example, in a series of papers by F. D. Richardson and others in the Journal of the Iron and Steel Institute starting in 1948.

A complication is that the equilibrium constant must be expressed in effective concentrations rather than those which would be revealed by analysis. These effective concentrations are called activities. The equilibrium constant is given by the product of the equilibrium activities of the resultants divided by the product of those of the reactants. The standard state is also expressed in terms of activities.

The factor by which the ordinary concentration must be multiplied to give the activity is called the activity coefficient. For a substance in solution this can vary not only with its own concentration but also with the concentration of other dissolved substances.

The use of activity coefficients is considered a "fiddle" by some, but it is perfectly reasonable to suppose that there can be interaction between dissolved substances, and the activity idea enables this to be expressed without imagining unlikely compounds (which was done before activities were introduced into slag/metal physical chemistry).

If there is no interaction the activity is equal to the concentration, *i.e.*, the activity coefficient = 1. Fortunately, under steelmaking conditions the activities of gases are represented satisfactorily by their partial pressures, so the treatment of the gas phase is simple.

The major recent development in the physical chemistry of slag/metal processes has been the experimental determination, indirect calculation, and study of relations between activity coefficients.

In addition to this theoretical complication there are experimental difficulties in equilibrium-constant determinations. A good example is thermal diffusion, that is, the tendency of the lighter component of a gas mixture to concentrate in the hotter part of the apparatus. This caused considerable errors in equilibrium-constant determination for the reduction of ferrous oxide by hydrogen when there was no flow through the apparatus and the composition of the steam/hydrogen mixture was determined in the cooler part. The detection of this effect was due to repeat determinations using different methods.

This consideration justifies the replication of research which is such a feature of slag-metal physical chemistry. Experimental work has recently been done to find the gas flow through an apparatus needed to eliminate thermal diffusion[1]. It has also been recognized that there is a danger of thermal diffusion, or some effect rather similar, arising in a type of experiment much used for equilibrium constant determination between gas and liquid[2]. Here the gas, incompletely preheated, is caused to flow over the melt (generally heated by induction): full preheating is needed to eliminate errors.

Another important difficulty in determining slag/metal equilibria directly, which arises in many high-temperature investigations, is that refractories tend to participate in reactions. This is most marked under reducing conditions, when, for example, volatile silicon monoxide is formed and can contaminate both liquid and gas phases. When direct solution of refractory in either slag or metal (but not both) is the difficulty it can often be minimized.

For example, if metal/refractory contact is to be avoided the slag is melted in a suitable crucible and a thin rod of metal is dipped in[3]. The metal forms a drop small enough to attain temperature and chemical equilibrium with the slag rapidly. The drop is then removed and analyzed. When slag/refractory interaction is the difficulty, the metal can be melted in a brick of porous refractory, *e.g.*, magnesia, and small portions of slag dropped on to the metal surface. The portions of slag melt rapidly and are continuously soaked into the refractory, this ensuring that the slag in contact with metal is uncontaminated. Samples of metal are taken periodically until the composition is steady: this represents the equilibrium between slag and metal at the given temperature.

This method has been used for studying phosphorus distribution, using radioactive phosphorus to facilitate analysis[4]. The spinning crucible is another method. It was developed a considerable time ago. Here the liquid metal forms an inner surface on which the slag rests without contact with the crucible[5].

It is also possible to avoid having to contain metal and slag simultaneously (and also to study activities of components in each) if they are separately brought to equilibrium with a gas. Then if the gas composition and the temperature are the same it follows that the slag and metal would be in equilibrium with each other. Instead of gas another liquid can be used, in which the activity coefficient of the substance under consideration is known.

For example, liquid silver has recently been used to study solutions of copper, sulphur, manganese, and carbon in iron[6]. Since carbon is practically insoluble in silver, this technique is particularly suitable for studying the effect of carbon in iron on the activities of the other elements, but difficulties can arise, particularly in sampling the metals.

Equilibrium constants can be found by direct determination of partial pressures of the gaseous components. An example is the ferrous oxide-hydrogen-water equilibrium already mentioned. For slag/metal processes the pressures of some components involved are often so low that special methods of measuring them are needed.

An interesting recent development is the improvement of the Knudsen-cell method. Ordinarily, this consists in letting the vapour effuse from a heated box through a small hole (of known cross-sectional area) and finding how much effuses in a known time. This gives the overall vapour pressure without any information on the molecules involved. The improvement is to suspend the box and provide it with two effusion holes so arranged that the effusion twists the box about the suspension. By measuring the twist and combining this with the ordinary effusion data the average molecular weight of the effusing material can also be calculated[7].

Vapour-pressure studies are a very direct approach to the determination of activities in alloys, The field has probably been stimulated recently by the development of vacuum treatment methods. Should such methods be extended, as recently suggested, to desulphurization of pig-iron and to nitrogen removal from metal blown with air instead of oxygen[8], recent work on slag and metal vapour pressures and solubilities will acquire increased importance.

(b) Free-energy Change from Heat of Reaction and Entropy

Sometimes, for example with very slow reactions, it becomes unsuitable to find the free-energy change of a process by determining the equilibrium constant. The calorimetric method is an alternative. This is based on the relation that the free-energy change associated with a reaction is given by the difference between the corresponding heat of reaction and the energy involved in the entropy change. Accurate values of specific heats, heats of reaction, and transformations are required, and extensive tabulations are already available[9]. It will be recalled that, with a knowledge of specific heats, the heat of a reaction at any temperature can be calculated if it is known at one temperature.

The main difficulties here, both in specific-heat and heat-of-reaction (or transformation) determinations arise in high-temperature work, and much development work on calorimeter design has been done. For accuracy at high temperatures the adiabatic calorimeter, in which, by electric heating, the temperature of the outer jacket is kept the same as that of the calorimeter proper, is now used almost exclusively. Experimental difficulties are great and such apparatus[10] is, and will probably remain, rare.

Calorimetric work is, of course, also of interest for heat-balance calculations. Here serious gaps in our knowledge still remain. For example, accuracy in blastfurnace heat balances is generally impossible because heats of formation of many slags are not known.

(c) Free-energy Change from Electromotive Force

If a reaction can be harnessed in an electric cell the maximum work of which it is capable, that is, the decrease in free energy accompanying it, can be found conveniently. The free-energy decrease is given by the product of the amount of electricity which would pass if the reaction went to completion and the voltage of the cell when virtually no current is being taken from it. Both can be found experimentally, but for high-temperature slag/metal systems care in cell design is needed.

The method is not always applicable. For example, highly ferruginous slags tend to behave like metallic conductors and so cannot be used as the electrolyte. Results are often less accurate than with the other two methods **(a)** and **(b)**.

The method is useful for finding activities of melt components and, if the relation between activity and concentration is known, it forms a possible basis for rapid analysis both of slags and metals. For example, two silicon-carbide electrodes, one in a reference slag and the other in the test slag have been tried for determining its silica content from the cell electromotive force. There are many practical difficulties in this application, but in principle the method is sound.

II—ACTIVITIES

As already mentioned, activity-determinations and manipulations have formed the main subject of recent physico-chemical work on slag/metal systems.

(a) Metallic Solutions

For relatively simple solutions reasonably good agreement on activity-concentration relationships arrived at by different investigators is now being obtained. For more complex solutions, too, progress has been made, particularly in the calculation of the mutual effects on the activity coefficients of two dissolved substances from values for the solution of each separately.

A convenient way of expressing the effect has been found[12]. This is as the ratio (symbolized by ε) of the change in the logarithm of the activity coefficient of the first dissolved substance to the corresponding change (both being very small) in the concentration of the second as the latter approaches zero. It has recently been shown that there is a relatively simple relation between ε and activity coefficients for dissolved oxygen present at concentrations substantially less than that of the other dissolved substance. The simple relation is applicable only when the interaction between the dissolved substances is not very strong (*e.g.*, oxygen with nickel). When there is strong interaction (*e.g.*, oxygen with aluminium) a more complicated relation holds[13].

(b) Slags

Just as with metal solutions, recent emphasis has been on the calculation of the properties of complex slags from the properties of simpler ones. For example, much attention has been given to what is loosely called the "oxidizing power" of slags. A more correct term is "oxygen potential," which is closely related to the free-energy change accompanying the movement of oxygen between slag and metal.

A recent approach has been to express this for complex slags in terms of ferric iron concentration[14], but a complication is that the other components do not behave similarly; for instance, the effect of phosphoric oxide on the oxygen potential is not the same as that of the same molar concentration of silica[15]. This complication applies to proposals in which "acid" oxides are taken as one component, "basic" oxides as the second, and ferrous oxide as the third[16]. For ferrous oxide-ferric oxide-lime-silica-phosphoric oxide slag the oxygen potential can, it has recently been claimed, be found from data for ferrous oxide-ferric oxide-silica and ferrous oxide-ferric oxide-phosphoric acid[17].

A rather more fundamental approach to slag/metal process free-energy change problems has been made recently: the application of statistical mechanics. This has often been used for gas equilibrium calculations and is based on the distribution of particles between the various energy states (the partition function). A model of how the energy-sharing particles exist is needed. The simplest system of interest to slag/metal process chemistry has recently been treated in this way[18].

The FeO slag here was assumed to be structurally similar to the corresponding solid, consisting of

iron ions, oxygen ions, lattice defects, and electron deficiencies. The ions are held by electrostatic forces, and, on melting, the whole structure merely expands, giving greater freedom of movement to the ions.

With some further reasonable restrictions on the relative positions of ions, the partial pressures of oxygen for various compositions and temperatures was calculated.

Good agreement of calculated values with a good set of experimental values was obtained. On the other hand, without the restriction on the distribution assumed in the treatment, the agreement was poor. This is an interesting example of the possibilities of a combined thermodynamic and structural approach. Structural information on slags and oxides has been accumulating for a considerable time, *e.g.*, from slag viscosity determination studies on glasses.

Another example of a combined structural and thermodynamic approach is a recent study of ferrous oxide-silica slag[19]. Now the activity of ferrous oxide in this system is more than expected (assuming no interaction) at low silica concentrations and less at high, which is contrary to the behaviour of other oxides. Ferrous oxide actually has less iron than the formula indicates, and there must be some ferric iron ions in the lattice to keep it electrically neutral and so it is interesting to see whether this non-stoichiometry produces the peculiar activity relation.

For this approach a model was taken in which, as in our previous example, the solid structure was assumed to persist into the liquid state. By considering how the ferrous and ferric ions could be arranged, the effect of the ferric ion could be allowed for (through the entropy, which is related to the probability of the arrangement). Therefore, the activity for ideal (stoichiometric) FeO could be calculated. For this idealized FeO its activity in FeO-silica melts was found not to exceed the no-interaction value for all silica concentrations, a behaviour which brings it into line with other oxides such as PbO, MnO. So it is reasonable to attribute the unusual activity behaviour of real FeO to its deviations from the stoichiometric composition.

The practical application of thermochemistry is hampered by various factors. Primarily by the fact that processes are not left to come to equilibrium (the idea of an open-hearth at equilibrium is absurd unless it is required to produce not steel but ferruginous slag). Another factor is that there is a gradient both of temperature and composition through slag and metal, and at the boundary, where complex electro-chemical effects probably also occur.

There is the further difficulty that the problems of analysing steel for oxygen, an element which greatly affects the slag/metal distribution for example of sulphur, have still not been solved. The question of gradients, involving as it does, the movement of materials and heat brings us to the second main field of activity in slag/metal process physical chemistry.

III—RATES OF PROCESSES

The free-energy change for a process is directly proportional to the extent to which it occurs. But this does not hold for the rate of a process, since here complex scaling affects apply. Even a certain apparent rate of reaction per sq. in. of contact area of slag/metal in a crucible would not necessarily correspond to the same rate per sq. in. in a bigger vessel.

Laboratory rate studies on slag/metal systems are as yet better regarded as showing the ways in which various processes can occur, and not as providing the answer as to which would be the rate-controlling process under practical conditions, still less as to the size of plant needed for a given output.

In addition to the difficulty of using their results, rate studies of apparently simple processes often show them to be complicated. For example, recent work in which slag and metal were stirred in a carbon pot, designed to study sulphur transfer between the two liquids, showed that not only sulphur moved, but also carbon, oxygen, iron, silicon, aluminium, and electricity.[20]

This electro-chemical effect is to be expected because of the ionic nature of the slag, and it is likely that container walls can play a part as conductors of electricity. An interesting application of the electro-chemical nature of slag/metal transfers is suggested by recent work in which increases in the rate of sulphur transfer from metal to slag have been achieved by electrolysis[21].

The carbon-oxygen reaction in liquid iron has been studied extensively. An interesting factor here is the formation, growth, and movement of carbon monoxide bubbles. The difficulty of nucleation of carbon monoxide bubbles has long been recognized (great pressures are needed), and confirmed in experiments. These showed that, with a smooth crucible, little reaction occurred between carbon and oxygen dissolved in iron, whereas if irregularities and pores were available to facilitate nucleation the reaction proceeds rapidly.

Work in this field[22] has some similarities to processes which have been tackled in chemical engineering, and the closer relation between process metallurgical research and chemical engineering, which has been a recent, welcome development, will undoubtedly benefit the development of slag/metal reaction rate knowledge.

Closely related to rate studies are determinations of properties such as rates of diffusion in liquid metals and slags and viscosities. Rates of diffusion are not likely to play an important role in practical processes, but viscosity of the slag may well do so and is, moreover, of operating importance. Both provide information on structure. Slag viscosities have been studied for a long time in a wide variety of apparatus: rotating crucibles, rotating bobs, rocking crucibles, oscillating plates, and falling bobs.

Much of the early work can be written off because graphite crucibles were used, leading to reduction of iron oxide components and general uncertainty of the composition. Recently a wealth

of reliable data has been accumulated and from an examination of these a simplifying relationship has been found between composition and viscosity. According to this, the slag viscosity at a given temperature depends on the concentrations of silica, alumina, and lime; calcium fluoride is the only component so far found which has an independent effect[23].

IV—OTHER WORK

Some researches on the physical chemistry of slag/metal processes do not fall entirely into either the thermochemistry or rate classifications. Such work is mainly that directed to the solution of particular problems of importance in practice.

As an example we may take slag foaming. Systematic laboratory experiments on synthetic slags[24] are now supplementing the numerous observations made on steelmelting furnaces. Foam stability, surface tension, and viscosity have been measured and attempts made to calculate the surface, as distinct from the overall, concentration of silica[25]. The surface activity of phosphoric oxide is probably an important factor in foaming, and the known action of relatively insoluble powders, like chromic oxide, is due to the layers they form on bubble surfaces, preventing coalescence.

Fume formation is a problem to which much attention has recently been given. In converters, and perhaps also in the open-hearth, high local temperatures make direct evaporation of iron and its subsequent oxidation to the brown fume the probable explanation. But fume formation has also been observed where the only reactions are those absorbing heat, such as in the reaction of iron oxide with iron-carbon melts[26]. Bubble bursting is a possible factor, and this and the other possibility of unstable intermediate compounds, is under study.

The development of better experimental techniques is an essential part of the general progress of research on the physical chemistry of slag/metal processes. For example, to enable research to keep abreast of oxygen-blowing processes with their higher temperatures, laboratory furnaces capable of higher temperatures are needed. In the conventional tube furnace this means both improved heating elements and refractory tubes. Furnaces with the heating element inside instead of outside the tube are a useful development, but this still leaves the problem of refractory.

A technique called levitation melting avoids refractory completely. In this a high-frequency induction furnace has a specially shaped coil in which a drop of metal can remain suspended without physical contact. There are still difficulties in applying the technique to combined slag/metal systems.

Of two other possibilities one is the plasma jet, in which an electric arc is used to produce a stream of particles generating very high temperatures. The other is the image furnace, in which radiant heat (*e.g.*, from an electric arc) is focused onto the material. If not too much is reflected back, high temperatures can be obtained. By focusing on to the centre of the surface of a relatively large batch of material, the melted portion remains surrounded by unmelted material. Thus the material acts as its own container and refractory troubles do not occur; on the other hand, temperature gradients exist, making quantitative work difficult. Furthermore, the temperature attained is very sensitive to the reflectivity of the material.

Much existing physico-chemical information remains unused because of inconvenient presentation. This is a field where effort would be well rewarded, particularly if simple graphical presentation were achieved.

Although this short paper has considered mainly the laboratory side of physico-chemical research on slag/metal processes, this is not to minimize the importance of full-scale trials. Such trials, which in steelmaking are easier to organize than in blast-furnace practice, must for a long time remain an essential supplement to laboratory work.

The co-operation between operators and scientists, which is such a feature of the British iron and steel industry, is an important factor both in the development and the application of slag/metal process physico-chemical research.

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IT IS REPORTED that hot-dip aluminizing of steel wire, providing excellent resistance to atmosphere and high-temperature corrosion, has been piloted to a semi-commercial stage at the National Metallurgical Laboratory at Jamshedpur, India.

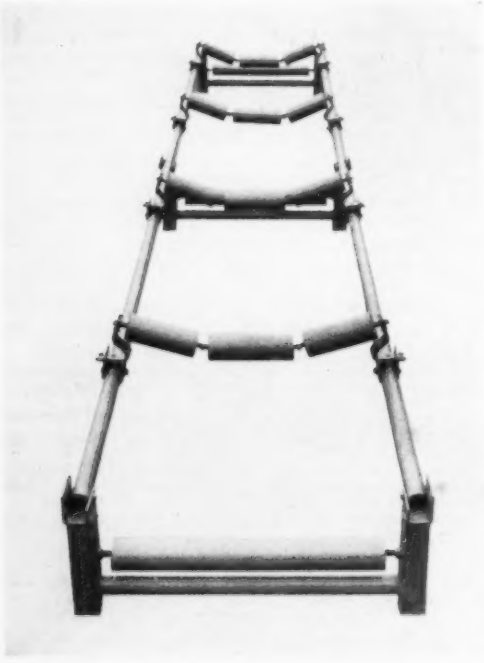
NEW TUBULAR CONVEYOR FRAMEWORK

INTRODUCTION of a new type of tubular conveyor framework with cushion mounted slung idlers designed to give resilience to the belt under differing load conditions is announced by Richard Sutcliffe, Limited, Horbury, Wakefield. This arrangement allows the belt to form a deeper trough as the load increases, thus decreasing the chance of spillage. An equally important advantage is that individual members can be easily and neatly packed to facilitate transport underground. The framework is the open type, has no cover sheets, and may be simply and speedily erected or dismantled.

Up to and including 30-in. belt width, the stools are at 10-ft. centres and the idlers at 5-ft. centres. For 36-in. and 42-in. belt widths the stool centres are 9 ft. and the idler centres 4 ft. 6 in.

The depth of trough is determined by the weight and nature of the load, the "give" in the idler being provided by a rubber cushioning block mounted between the stringer tube and the idler bracket. The maximum deflection from zero to maximum load is approximately 2½ in. The centre troughing idler spindle is pin jointed at its end to the wing idler spindles which, in turn, are hooked over the end idler brackets and locked in position. Support brackets on top of the stools are so arranged that the framework can be slung from the roof by ropes or chains. Allowance is also made for lateral adjustment of the idler sets.

The return and idler rollers are the same as those used in other types of Sutcliffe framework.



A NEW TYPE OF TUBULAR CONVEYOR FRAMEWORK INTRODUCED BY RICHARD SUTCLIFFE, LIMITED.

National Coal Board Specifications

SPECIFICATIONS recently issued by the National Coal Board include those mentioned below. The charge for each specification is 6d. unless otherwise stated.

No. 225/1960 relates to dimensional requirements for ferrous and non-ferrous split cotter pins. Certain general requirements are also given.

No. 232/1960 covers the principal dimensions of Edison-type screw lampcaps and lampholders intended for general purposes.

No. 233/1960 refers to 13-amp. fused-plugs, 13-amp. surface and flush-mounted shuttered socket outlets not combined with switches, metal socket outlet boxes, and insulated cover plates. Suitable cartridge fuse-links of all ratings up to 13-amp. for use in the fused-plugs shall be in accordance with BS 1362.

No. 237/1961 (price 2s.) covers percussive bits and rods with screwed connections, percussive bits and rods with tapered connections, and stems, for percussive drilling in rock for general underground purposes, and, where suitable, for shaft sinking.

No. 238/1961 relates to wing nuts which shall be designated by the nominal size of the screw thread.

No. 239/1961 covers the principal dimensions of lampcaps and lampholders intended for use on voltages not exceeding 250 V.

No. 240/1961 relates to hexagon socket head cap screws, hexagon socket set screws, hexagon socket head shoulder screws (stripper bolts), and hexagon wrench keys.

No. 242/1961 covers screwed steel conduit and screwed conduit fittings.

Agency Contracts

The International Chamber of Commerce has published a Guide for the Drawing Up of Agency Contracts between Parties Residing in Different Countries with the object of indicating the many factors and contingencies to which the parties and their legal advisers might appropriately give their attention when establishing agencies in foreign countries. The guide deals with agency in the strict legal sense of the word and has no concern with so-called "agents" who act as principals, such as distributors who sell in their own right under exclusive sales agreements. Copies are obtainable from the British National Committee, International Chamber of Commerce, 15, Kingsway, London, W.C.2 (4s. 6d. to non members).

Arresting Coal-dust Explosions

Practical Aspects of Stone-dust Barriers

by H. S. EISNER*

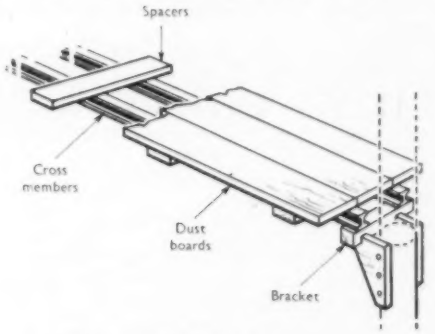
UNDER the recent Coal Mines (Precautions against Inflammable Dust) (Variation) Regulation, 1960, stone-dust barriers become compulsory in certain roads in British coal mines. While many mines already have experience of barriers others may not, and a brief review of some of the problems of installation and maintenance may be helpful.

A coal-dust explosion is generally started by a firedamp explosion, frequently at the coal face, which raises coal dust in the adjoining roadways into the air and ignites it. This, in turn, produces further blast and flame, and if conditions are suitable this may result in a self-sustaining coal-dust explosion. The characteristics of such an explosion are a pioneering blast front moving ahead of the explosion flame and at a slightly higher speed; the distance between the two is thus increasing as the explosion proceeds along the roadways.

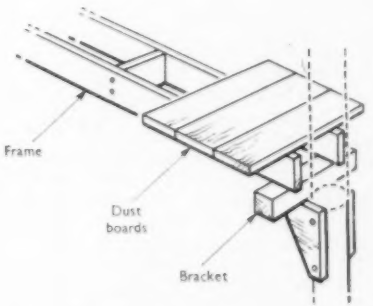
A stone-dust barrier is a means of arresting a coal-dust explosion in a mine roadway by throwing into the path of the advancing flame a large quantity of stone dust normally stored on a number of shelves placed across the roadway. The barrier is upset and the dust dispersed by the blast wave that precedes the explosion flame. To quench the flame successfully it is necessary that a minimum concentration of stone dust in the air exists over the whole cross-section of the roadway in the barrier zone at the moment when the flame arrives. A minimum quantity of dust of about 20 lb./sq. ft. of roadway cross-section is needed; in practice, more is used to give a margin of safety. In order to reduce the extent of the explosion as well as the make of afterdamp, it is also necessary that the barrier is fairly close to the origin of the explosion, but not so close that there is not time for the dust to be well dispersed before the flame reaches it.

Dispersion of Stone Dust

It might be thought that the dispersion of stone dust by the blast was a simple matter, requiring only the placing of sufficient stone dust on fixed shelves across the roadway. Experiment, however, has shown that this is not so and that, frequently, the blast from a coal-dust explosion may not be much stronger than is needed to raise coal dust (which is much more dispersible than limestone dust) into the air; in some cases the wind speed produced is no greater than about 2,000 ft./min. In order to ensure dispersion of the stone dust at such wind speeds the shelves on which the dust rests need to be moved and eventually disrupted in such a way that the dust is thrown into the air and distributed over the cross-section of the road. It is therefore essential that the shelf is



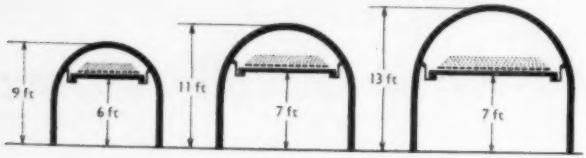
(a) Type I (approval Nos 1 & 2)



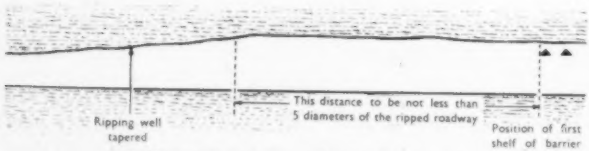
(b) Type II (approval Nos 3 and 4)

FIG. 1.—APPROVED TYPES OF STONE-DUST BARRIERS.

* Safety in Mines Research Establishment, Ministry of Power.



(a) Position of shelves in cross section of roadway


This distance to be not less than 5 diameters of the ripped roadway
Ripping well tapered
Position of first shelf of barrier

(b) Ripping the road at each side of the barrier

FIG. 2.—BARRIER SHELVES AND ROADWAY CROSS-SECTION.

easily disrupted by a comparatively weak blast and that the dust on it is uncaked and highly dispersible. The former requirement may be achieved by designing shelves to be unstable and by limiting the weight of dust on them, and the latter by using suitable dust loosely piled on the shelves.

At present two shelf designs have been given official approval; any further approvals are likely to be given only on the basis of exhaustive experimental evidence. The two designs are shown in Fig. 1 and consist in the main of dust boards on which the dust rests and cross members which in turn support the dust boards and which rest loosely on fixed brackets. The main differences between the two designs are that the cross members in the type 2 shelf are nailed together to form a horizontal frame and that the dust boards run parallel instead of at right angles to the direction of the roadway. To ensure instability, it is important that in both designs the distance between the outside edges of the cross members does not exceed the stated maximum. In addition, the greater height of the cross members of the type 2 shelf makes for greater air resistance; this shelf is therefore more likely to respond to weak explosions than type 1. The instability of the type 2 shelf is further increased by the smaller quantity of dust that is placed on it.

While the actual design of the shelves is closely circumscribed by approval their erection in the roadway is not, and must clearly depend to a large extent on local conditions.

Position of Shelves in Roadway Cross-section

There is a natural tendency to place shelves as high in the roof as possible, particularly in roadways with low headroom. Experiment has however shown that his may not be good practice; even though the dust heap is nowhere closer than the stipulated 4 in. to the roof, it may not always be exposed to the maximum blast within the cross-section of the roadway, which generally occurs near the centre. It is thus desirable, particularly in roadways with large cross-sections, to lower the shelves towards the roadway centre as far as is compatible with reasonable headroom beneath them (Fig. 2a).

If the roadway roof is too low to enable this to be done it should be ripped. As the resulting ripping lip could, however, shelter the barrier from the blast, it is necessary to carry the ripping well beyond the limits of the shelves on both sides of the barrier. The distance required should be related to the diameter of the ripped roadway; at present, a distance of five diameters on each side of the barrier is required. To minimize the sheltering effect still further it is desirable to taper the ripping to form a gradually widening approach (Fig. 2b).

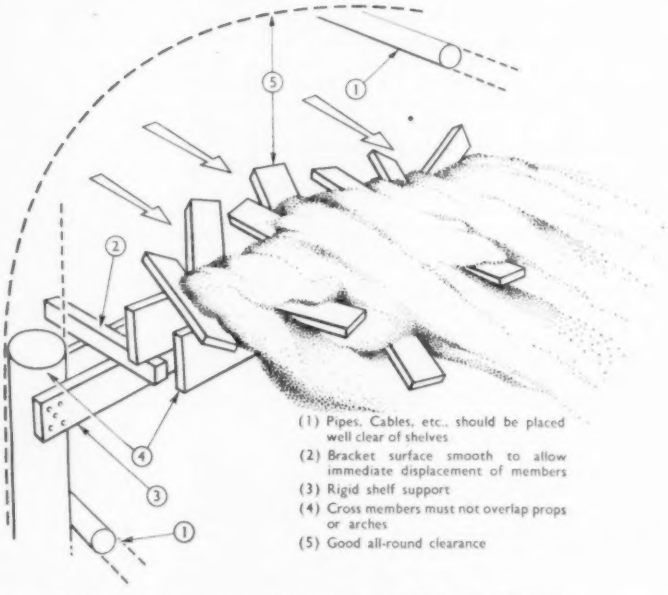

5
1
2
4
3
1
(1) Pipes, Cables, etc., should be placed well clear of shelves
(2) Bracket surface smooth to allow immediate displacement of members
(3) Rigid shelf support
(4) Cross members must not overlap props or arches
(5) Good all-round clearance

FIG. 3.—UNOBSTRUCTED MOVEMENT OF BARRIER SHELVES.

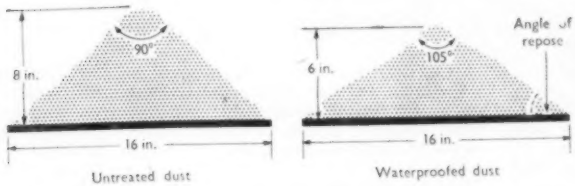


FIG. 4.—MAXIMUM AMOUNT OF DUST LOOSELY PILED ON SHELVES.

Shelves should be erected in such a way that dust boards and cross members may fly along the roadway without obstruction (Fig. 3). Moreover, they should also be reasonably free to move in an upward direction. Thus care should be taken that pipes, cables, signal wires, etc., do not interfere with this motion and, subject to the shelves not being placed too high, they should, wherever possible, lie above any such longitudinal obstructions. On no account should pipes, etc., bear on the shelves either from above or below. Where, unavoidably, pipes have to be above the shelves it is best to use type 2 shelves; with this shelf, as a result of the longitudinal direction of the dust boards, only a small section of the dust pile is likely to be obstructed.

The cross members, which are placed loosely on the supporting brackets, should be as free as possible to slide on them in a longitudinal direction, so that the shelf will be disrupted by the weakest explosions that are likely to occur. It is therefore necessary that the brackets are rigidly attached to the roadway supports. With brackets that hang freely from the roof a much larger impulse is needed to separate cross members from brackets and this method of supporting is therefore not suitable. Again, in the case of arched or prop supports, the ends of the cross members must not overlap the supports nor must their movement along the brackets be impeded by bolt heads or notches or grooves cut into the bracket. Finally, brackets must be adjustable about a horizontal axis within the cross-section, so that even with inclined supports it is possible to maintain the dust boards reasonably horizontal.

Stone Dust

The dust on the shelves should be highly dispersible and should remain so for a considerable time even in conditions of high humidity. Barriers should never, of course, be placed in a position where water from the roof can run onto the dust. Where barriers are frequently re-erected and the dust on them discarded, or used to stone dust the roadway, untreated stone dust can be used in places of relative humidity up to about 70 per cent. In all other cases waterproofed stone dust should be used.

The stone dust should be emptied on to the shelves by pouring from bags. It is not good practice to place the bags on the shelf and slit them open along the top—even if all surplus paper is removed. The dust should be allowed to assume its natural angle of repose and should on no account be tamped or "shaped" by running a straight edge over its surface (Fig. 4). It has been found that in humid conditions tamped and "shaped" dust heaps are far more liable to form a crust than naturally poured or sprinkled dust heaps. Also, no attempt should be made to fit lips round the edges of the dust boards in order to prevent the dust from falling off.

Coal dust settling on top of the stone-dust piles is not as dangerous as is sometimes thought. It is much better practice to leave it alone than to scrape it off; the amount of coal dust in the film is generally very small compared with the stone dust beneath, and scraping it off merely tends to consolidate the latter. It may well be that if all the above guiding rules are applied, the total quantity of dust that can be accommodated on a shelf, particularly in the case of waterproofed stone dust which has a small angle of repose, falls considerably short of the maximum quantity permitted on each shelf, especially with the type 1 shelf. If so, any further quantity of dust necessary to complete the total amount required for the particular cross-section of roadway should be placed on additional shelves.

Marking of Barriers

It is clear from the foregoing that sound erection and good maintenance of barriers are very important and may, indeed, prove critical. In order to facilitate inspection and maintenance it is common practice in continental mines to place a notice board near each barrier on which the following details are chalked:—(1) The cross-section of the roadway in square feet; (2) the total quantity of dust on the barrier; (3) the number of shelves; (4) the quantity of dust on each shelf; (5) the date of stone dust renewal, and (6) the date of inspection and the initials of the inspecting official. While all of these markings may not always be suitable for British conditions, the principle is sound.

Conclusions

Stone-dust barriers must be erected in such a way that even a weak explosion causes them to discharge their dust into the roadway cross-section. To this end it is necessary to install shelves which are capable of being disrupted easily in such a way that their disruption is not hindered by obstacles in the roadway cross-section. In addition, stone dust, which should be non-caking, must be piled loosely on the shelves and only in such quantities as can be accommodated by relying solely on the natural angle of repose of the material.

THE LD PROCESS may be used in the Rumanian Galatz steelworks, Echo de la Bourse (Brussels) reports. The works, scheduled for completion by 1964, will be designed for an eventual output of 4,000,000 to 5,000,000 tons per annum.

COAL CRUSHER FOR

Spencer Coking Plant

COAL for the coking plant which is being built at the new Spencer Works of Richard Thomas & Baldwins, Limited, at Llanwern, Newport (Mon), will be crushed in a 14-ft. dia., 22-ft. long Pennsylvania spider-mounted Bradford breaker now under construction in the Fraser & Chalmers Engineering Works of the General Electric Company, Limited, at Erith (Kent). The machine, which is being supplied by GEC through Mitchell Engineering, Limited, is the largest of the Bradford breaker range and will act as a primary crusher, receiving run-of-mine coal up to 12 in. at a rate of 600 ton/hr., and giving a product size of below 1½ in.

Coal enters one end of the slowly rotating breaker, and the oversize is lifted on radial shelves before dropping on to the heavy perforated screen plates. Gravity impact breaks the coal, which, on reaching the desired product size, is immediately discharged through the plates. Any refuse not broken is passed through the machine and rejected at the far end.

This size of machine is capable of accepting 30-in. lumps of coal, and its capacity can be increased by fitting a hammermill rotor inside the breaker at the discharge end. Suitable internal adjustments can be made to suit the type of coal being fed into the breaker, and the screen plates may be easily changed to obtain a different product size.

SOVIET AID FOR INDIA

ACCORDING to an agreement reached between India and the USSR, India is to receive Rs. 60 crores for financing six major power and oil development projects. These include a hydro-electric power station at Bhakra, with a total capacity of 480,000 kW., and an oil refinery in Gujarat having a refining capacity of 2,000,000 tons of crude oil per year, and a coal washery with an annual capacity of 3,000,000 tons at Bihar.

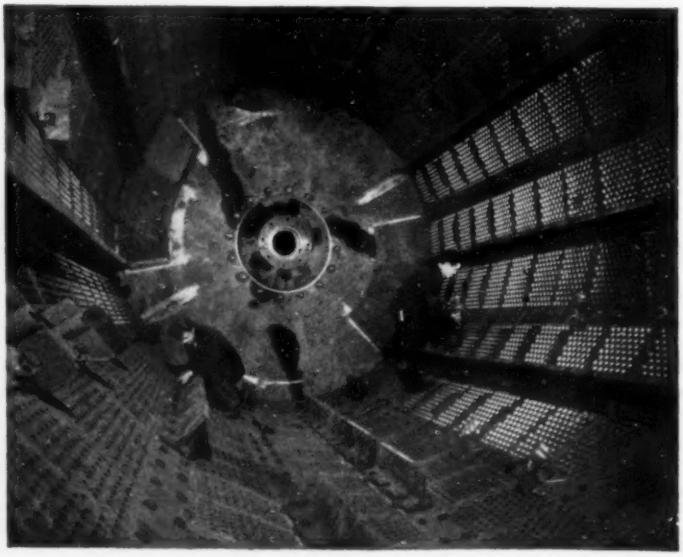
Other projects to be financed include a refractories plant near Bihar for the production of magnesite and fireclay products, and equipment for the exploration, development, and production of oil and gas by the Oil and Natural Gas Commission in Cambay, Ankleshwar, and in other areas.

The agreement stipulates that the USSR should prepare detailed project reports and drawings, supply equipment, machinery spare parts, and other materials, as well as render technical assistance in the setting up of these projects and putting them into operation.

India Produces More Iron Ore

PRODUCTION of iron ore in India in 1960 was 10,655,000 m. tons, an increase of 33 per cent. on 1959, according to the Indian Bureau of Mines. Orissa was the principal producing State (3,720,000 m. tons), followed by Bihar (2,844,000 m. tons). Mysore, Madhya Pradesh, and Maharashtra recorded outputs of 1,867,000, 1,449,000, and 320,000 m. tons, respectively.

Despatches of ore for consumption at iron and steel works last year totalled 7,322,000 m. tons, an increase of 27 per cent. on the previous year's 5,677,000 m. tons. Exports during the year totalled 2,443,000 m. tons, compared with 2,024,000 m. tons in 1959.



INSIDE A BRADFORD BREAKER FOR RICHARD THOMAS & BALDWINS, LIMITED, UNDER CONSTRUCTION AT THE FRASER & CHALMERS ENGINEERING WORKS OF THE GENERAL ELECTRIC COMPANY, LIMITED, AT ERITH (KENT).
WHEN INSTALLED THE MACHINE WILL BE ENCLOSED IN A LIGHT STEEL HOUSING.

Book Reviews

Physical Examination of Metals. Edited by Bruce Chalmers, D.Sc., Ph.D., and A. G. Quarrell, A.R.C.S., D.Sc., F.I.M. Edward Arnold (Publishers), Limited, 41, Maddox Street, London, W.1. £8 8s.

IT is well known that the microscope is a physical means of examining both iron and coal, and in one chapter of this book we can learn about modern optical methods for studying metals and minerals. In another of its 18 chapters we have a compact description of electron microscopy.

Altogether 16 different expert authors provide us with accounts of the application of various physical techniques (excluding radiography) to the study of metals. The result is an instrumentalists' delight rather than a handbook for the technical metallurgist who may want to know the detailed experimental set-up for doing the tests. Even so, the latter is provided with a lot of up-to-date information not only on techniques but about physical metallurgy and alloy systems.

The principle generally adopted is for each chapter to deal with a method of examination and then to include the metallurgical features which it covers and conclude with references. This means that the very extensive index is chiefly based on the techniques and one has to do a certain amount of searching to find the metallurgical details. For instance, one might be interested in the detection of internal fissures (or shatter cracks) in rails, and what the Sperry detector car does about it. These points are not referred to in the index, but there is a paragraph dealing with them on p. 156 under "Electrical Measurements." The chapter entitled "Ultrasonic Flaw Detection in Metals" is excellent.

The general subject of flaw detection does contain a large number of items in the index including a reference to cast iron. Here it is stated that this material presents difficulties for ultrasonic testing. The application of micro-radiography (p. 830) and autoradiography (p. 843) to cast iron is also mentioned.

The first edition of this book appeared in 1941 and the increase of interest in the subject together with the development of methods has now required a completely new work. It is up-to-date, for chapter VII is devoted to neutron diffraction, and, in general, it will be well received by physical metallurgists.

The Continuous Casting of Steel in Commercial Use. By K. P. Korotkov, N. P. Maiorov, A. A. Skvortsov, and A. D. Akimenko. Translated from the Russian by V. Alford and edited by H. T. Protheroe, B.Sc., Ph.D., of the Department of Metallurgy, Sheffield University. Pergamon Press, Limited, Headington Hill Hall, Oxford. 171 pp. 50s.

THIS book is concerned with the design, building, testing, and operation of the Krasnoye Sormovo continuous casting machine, which was commissioned in 1955. In the present critical stage of development of the process in the UK, where several full-scale plants are currently being built, the book is particularly interesting because it is largely from the Krasnoye Sormovo plant that the Russians have obtained the necessary data and experience on which their own subsequent expansion in this field has been based.

In chapter 1 the authors give a detailed description of the design and layout of the plant, which were based on the results of extensive research into the basic physics of the process, discussed in chapter 2. Of special interest here is the thermo-hydraulic analogue used to estimate heat transfer. Chapter 3 is concerned with the thorough and rigorous acceptance tests. Operating data are given in chapter 4; attention is given to metal temperature and to primary and secondary cooling, and the process of solidification is examined and a heat balance given. Tundish refractories are also discussed here. In chapter 5 the authors turn to the product, discussing homogeneity, inclusion content, surface quality and mechanical properties, and comparing the material with conventionally cast products. The remaining chapters are rather brief, but, nevertheless, important; chapter 6 concerns instrumentation and automation, chapter 7 deals with the consumption of electricity, gas, water, oxygen, and compressed air, and chapter 8 contains an appraisal of the economics. Finally, an appendix lists the comprehensive process instructions on the plant.

In the interests of speedy publication, Pergamon Press has used non-letterpress setting and photolithography; nevertheless, the book is well set out and easy to read. One serious drawback, however, is the quality of the photographs; macro-sections and sulphur-prints, never easy to reproduce, have suffered rather badly. A number of errors have also persisted; for instance, there are mistakes, apparently purely arithmetical, in the tables in chapter 4 which makes cross-reference between them sometimes contradictory. Throughout the same chapter there is constant reference to the "drop" in temperature of the cooling water in the mould and spray zones, where it must obviously increase in temperature.

These faults, however, detract very little from the importance of this publication. It contains a wealth of information of value alike to students, research workers, and practical metallurgists and engineers concerned with continuous casting of steel. Such a book has been called for now for a number of years, and it can be highly recommended.

Australian Iron-ore Mining

THE Australian Minister for National Development has stated that while it is expected to earn national income from oversea sales of iron ore, the primary consideration is conservation of resources for Australia's own use. Ore from small deposits may be exported in full, but a limitation must be kept on the total amount to be exported and the annual rate of export and the period over which export will be permitted in respect of each deposit. This will safeguard against the position of having allowed exports from existing deposits which later prove to be large enough to justify retention for local steel industry.

Deposits which are thought to be small may ultimately be proved to be large; for example, the Mount Goldsworthy deposit (Western Australia), originally thought to contain 7,000,000 tons, is now estimated to contain 25,000,000 tons of ore. A proportion of 50 per cent. of new ore resources will be reserved for the Australian steel industry.

NEW PACKAGING FOR *Ferro-alloy Briquettes*

FERRO-ALLOY briquettes are now being marketed in a new shape with new improved packaging by Union Carbide, Limited, London, W.1.

Fully automatic plant installed by the company embodies certain patented features providing uniform size, weight, texture, and quality of the briquettes and is believed to be the first of its type installed in Europe. By lower production costs, concessions on contracts for raw materials from the company's producing works, and economies in packing, Union Carbide is also able to reduce the cost of briquettes.

The company emphasizes that no change in melting practice is necessary when using the new briquettes. Each briquette carries the same amount

THE RANGE OF UNION CARBIDE BRIQUETTES, SHOWING (LEFT TO RIGHT): SILICON (YELLOW), ZIRCONIUM SILICON (BROWN), SILICO MANGANESE (GREY), CHROMIUM (GREEN), AND MANGANESE (RED).

of metal as before, is of the same weight, and is identified by the same colour code. In future, only 2-lb. briquettes (*i.e.*, with a metal content of 2 lb.) will be made, thus eliminating the premium on 1-lb. briquettes. As the accompanying photograph shows, the new briquettes have a "V" notch in the centre, enabling them to be split evenly into 1-lb. halves with an equal distribution of metal in each half. The new briquettes will be despatched in bundles with a weight of 60 lb. for silicon and zirconium silicon and 56 lb. for manganese and chromium, and 52 lb. for silico manganese. The bundles are packed with corrugated paper and continuously labelled according to the colour code. They are banded with a metal strap which is easily parted with a file tang. Deliveries up to 5 cwt. will be by loose bundles, but anything over that amount will have the bundles on non-returnable pallets.

The new type of packaging also makes for easier storing, handling, and stocktaking, it is claimed, while smaller bundles will be much easier to handle on the charging platform.

Union Carbide has been carrying out research into the ferro-silicon usage in foundries and find that over 80 per cent. of the briquettes used are 45/50 per cent. grade. The company has, therefore, decided only to manufacture 45/50 per cent. grade ferro-silicon briquettes; this has further contributed to the reduction in price to be made.

CORRESPONDENCE

ELECTRON PROBE MICROANALYZER

To the Editor of IRON AND COAL

SIR,—Glancing through a recent number of IRON AND COAL (March 17) I see that you report that "Metallurgists at Jones & Laughlin Steel Corporation have developed a new instrument called an electron probe microanalyzer."

Might I suggest that this statement is misleading, as, to the best of my knowledge, an instrument of this type was first developed by Castaing in France, and I believe AEI makes similar equipment?

A more advanced piece of equipment, the scanning analyzer, has been developed by Dr. Melford at the T. I. Hinxton Hall laboratories, and this design has been engineered by the Cambridge Instrument Company.

I write this note purely in the interests of accuracy!—Yours sincerely,

P. A. YOUNG,
General manager,
Head, Wrightson & Company, Limited,
Research and Development Division,
Teesdale Iron Works,
Thornaby-on-Tees.

West German Steel Production Record

STEEL production in West Germany, including the Saar, rose to a new record level of 34,100,000 m. tons in 1960, compared with 29,435,000 tons in 1959. Pig-iron production totalled 23,739,000 (21,602,000) tons.

Exports of steel products rose last year from 5,751,000 to 7,299,000 m. tons. Imports of steel were also higher at 3,900,000 tons.

Steel Wire for Armouring Submarine Cables

A revised British Standard (BS 1441:1961) has been issued for galvanized steel wire for armouring submarine cables. It covers the requirements for fully galvanized steel round wire in sizes ranging from 0.340 in. to 0.083 in. Methods of test, test requirements, and tolerances are specified, and details are provided relating to the various sizes for each class and tensile range of wire, the selection and testing of test samples, galvanizing requirements, packing, and identification.

New Literature

PUBLICATIONS received include the house magazines, catalogues, booklets, etc., referred to below. Readers wishing to obtain a copy of any of the items should write to the address given, at the same time mentioning IRON AND COAL.

SUFFOLK IRON FOUNDRY (1920), LIMITED, Stowmarket (Suffolk)—An article on "Oxy-acetylene Welding in Instrument Manufacture" is among the contents of the spring issue of Sif-Tips (6d.).

FOUNDRY SERVICES, LIMITED, Drayton Manor, Tamworth (Staffs)—"Blowholes and Inclusions in a Grey Iron Casting" is the subject of the main feature in the latest (No. 145) issue of Foseco Foundry Practice.

INCANDESCENT HEAT COMPANY, LIMITED, Cornwall Road, Smethwick, Birmingham—"How to Reach Us" is the title of a useful little brochure (V.55). Visitors travelling by rail, by bus, or by car will find the pamphlet most helpful.

SIMON ENGINEERING DUDLEY, LIMITED, Queen's Cross, Dudley (Worcs)—News of the activities of the company's hydraulic machinery division is contained in a two-page news-sheet, SHM News, the April issue of which is available.

NATIONAL SOCIETY FOR CLEAN AIR, Field House, Breams Buildings, London, E.C.4—The Proceedings of the society's Harrogate conference, held last year, has now been issued (25s.). The volume runs to 178 pages and includes the discussion on the various papers.

NORTH-WESTERN DIVISIONAL COAL BOARD, 40, Portland Street, Manchester 1—The April issue of Pit Prop is the second edition to appear in the new format. The editors express the hope that their readers like the new style. We certainly do. Pit Prop is both interesting to read and attractive in appearance.

SAMUEL OSBORN & COMPANY, LIMITED, Clyde Steel Works, Sheffield 3—Hand and Heart, quarterly magazine of the Osborn group, is very largely filled with news items from the various companies. The material is attractively presented and the whole is very readable. The spring issue is now available.

RESEARCH & CONTROL INSTRUMENTS, LIMITED, 207, Kings Cross Road, London, W.C.1—A new catalogue of radiation protection materials, equipment, and accessories, of interest to safety officers, radiographers, and all concerned with gamma or X-rays, is now available. Materials are listed suitable for every type of laboratory, production, or site work, and the advisory service offered by the firm is described.

APPLEBY-FRODINGHAM STEEL COMPANY, Scunthorpe (Lincs)—The April 6 issue of the App-Frod Record contained a photograph showing the preparation of the extensions to the ore-preparation plant, which is part of the "Temper" project. Also included was a two-page sketch giving the artist's impression of what the finished project will look like, the artist being Mr. A. C. Adams, the company's chief model maker.

TURNER BROS. ASBESTOS COMPANY, LIMITED, Rochdale (Lancs)—"Asbestos Textiles for the Electrical Industry," a new brochure, illustrates the many and varied ways in which the electrical field is served by asbestos textiles. Asbestos is used in turbo-generators, traction motors, colliery motors, mill motors, control gear, resistance coils and nets. As a result of the progress made in the selection and treatment of asbestos for electrical applications, asbestos impregnated with modern insulating resins will withstand the most arduous conditions encountered in electrical engineering practice. The brochure tells the story in considerable detail.

CASTROL INDUSTRIAL, LIMITED, Engineering Division, Castrol House, Marylebone Road, London, N.W.1—News of the latest development in two-line centralized lubrication systems suitable for either oil or grease is contained in an illustrated booklet, "Universal Centralized Lubrication Systems." The new system is being shown for the first time at the Engineering, Marine, Welding and Nuclear Energy Exhibition at Olympia.

BRITISH ELECTRICAL AND ALLIED MANUFACTURERS' ASSOCIATION, 36, Kingsway, London, W.C.2—The association has published a new and completely revised 100-page edition of its "Guide to Arc Welding Electrodes" (5s.), which is designed to assist the user in the choice of suitable electrodes for each purpose. The guide was first published in 1944, and this is the sixth edition of this publication, giving in a convenient form classified lists of British electrodes and a key to American and British electrode standards.

NATIONAL COAL BOARD, Chancery House, Chancery Lane, London, W.C.2—Markets for millions of tons of coal are at stake. To hold them productivity must be improved. That is the keynote of the month's message of Mr. Alfred Robens, the NCB chairman, in the April issue of Coal Magazine (4d.). Fenced in by the river Wear to the south and the Don to the north, the mining community at Washington, eight miles south of Newcastle-upon-Tyne, has links with the past—and hopes for the future. The story, in words and pictures, is an interesting one.

ROUND OAK STEEL WORKS, LIMITED, Brierley Hill (Staffs)—A variety of interesting features is to be found in the spring number of the Acorn. The second instalment of "The Level New Furnaces—a Story of the Black Country" covers "The Dawn of the Steel Age." The story is contributed by Mr. B. W. Berry, of the company's metallurgical department; it is a pleasure to follow his series. Mr. J. J. Peddie, mills superintendent, introduces a pictorial feature on "The Level Street Mills," while 23620134 Pte. Brian S. Harper, RAMC, formerly a junior chemist in the Round Oak Laboratory and now doing National Service, writes entertainingly on "April in Paris."

AEI STAND AT MOSCOW FAIR

PRODUCTS ranging from transistors to heavy turbine-generators will be on the Associated Electrical Industries, Limited, stand at the British Trade Fair to be held in Moscow from May 19 to June 14. The stand, one of the largest at the exhibition, will be dominated by a 20-ft. long mural by Abram Games, symbolizing the products which electrify this modern world.

AEI exhibits will include the MS7 mass spectrometer, two of which have recently been ordered by the Russians for use in nuclear research.

REDUCING COAL DEGRADATION

in Bunkers

MOVEMENT of coal under pressure from the weight of bunkered coal causes much of the degradation in large, orthodox, centre-outlet bunkers. Coal from the whole bunker cross-section is trying to move towards the centre outlet, and to eliminate this movement, Qualter Hall & Company, Limited, Barnsley (Yorks), has introduced anti-breakage trunking to give protection against breakage.

The trunking forms a slot or rectangular channel formed down one side of the bunker and terminating in the outlet chute. The channel can be formed by shoulders built inside the bunker walls or by adding vertical trunking on the outside of the bunker periphery. The open side of the trunking is of such a size that all the coal below the surface forms a natural arch across the opening (Fig. 1). This arching effect continues throughout the depth of the bunker to the outlet, making the flow of coal below the surface of the bunkered mass impossible.

When coal is fed from the outlet, the column of coal in the trunking flows vertically downwards and through the outlet. The trunking is kept full by more surface coal rolling into it, this coal eventually lying at the natural angle of repose leading into the top of the trunking.

Due to the arching effect, movement of the main body of the coal is prevented, the only movement being rolling of surface coal and steady vertical flow down the trunking. Thus there is no pressure on the coal moving towards the outlet and the forces acting on it in the small trunking are reduced by the friction on the three sides, so giving extra protection against breaking.

As coal is always being drawn from the top of the bunkered mass, any fresh coal fed down the spiral chute is fed to the trunking before the already bunkered coal. Hence, the bunker is bypassed. The continuous flow of coal down the trunking makes it essential that the side should be as smooth as possible and therefore renewable steel plate wearing surfaces are supplied. In a circular bunker, the abutments forming the trunking are made in fabricated sections with flush faces arranged for bolting together on the interior and for fixing to the bunker walls.

The hollow abutments can be used for fixing a ladderway, giving access from the top to the bottom of the bunker or they can be used as air connections. In square or rectangular bunkers, the trunk-

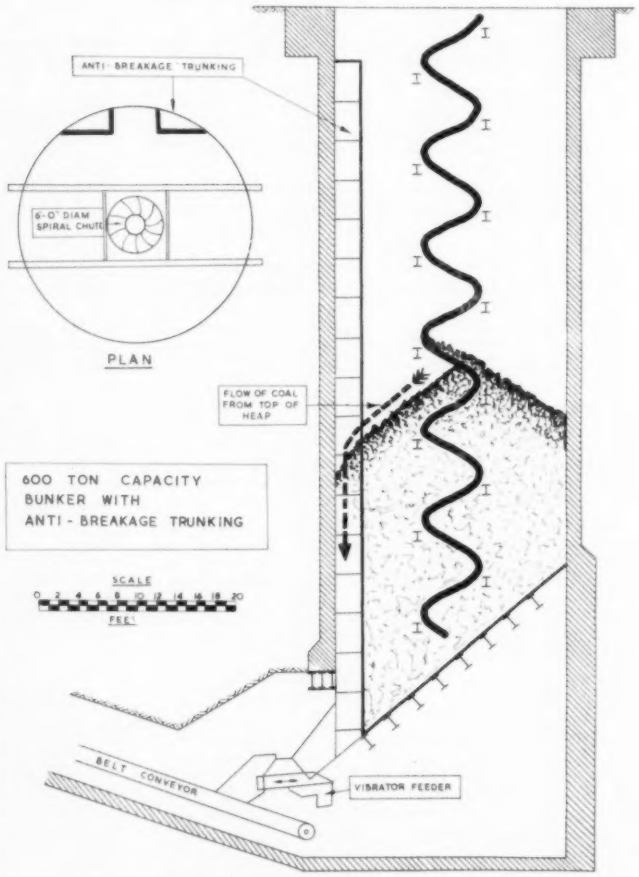


FIG. 1.—DIAGRAMMATIC SKETCH SHOWING HOW THE COAL BELOW THE SURFACE FORMS A NATURAL ARCH ACROSS THE OPENING.

ing can be of rectangular fabrication exterior to the bunker periphery, thus avoiding the construction of two abutments.

After extensive trials with various forms of trunking and bunkers, it has been found possible to apply this system to almost all types of new bunkers and many existing ones. The principal limitation is that it is not practicable to fit anti-breakage trunking into spiral-chute bunkers of a diameter less than 13 ft.

Coal "Down Under"

NEW ZEALAND'S coal industry is at the cross roads and a vigorous policy both by the industry and the Government as to its future is urgently needed, according to a statement by the president of the New Zealand Coal Merchants' Association, Mr. F. H. Cox.

Mr. Cox said that the industry wanted to be told by the Government whether it could face the future with confidence, or was nearing the end of its economic life. He said that coal still provided 38 per cent. of the fuel and power requirements of the Dominion. At the present rate of usage there was enough coal to last for 400 years. Production was 2,809,594 tons a year, or 23,681 tons less than the annual production 10 years ago.

The biggest hurdle in the marketing of coal was the high distribution costs.

A Queensland contractor has received an order from Japan for coking coal worth £A700,000 for use in Japanese steel works. This order for 184,000 tons is in addition to a previous order for 110,000 tons of coking coal for the same purpose.

DRY COAL CLEANING PLANT

MR. G. E. SHRIVES, technical assistant to an Area mechanical engineer in the National Coal Board's East Midlands Division, has designed a plant for the pneumatic cleaning of small coal to provide a moderately clean dry coal for power generation and other industrial use. The plant is designed to upgrade 1-in. by 0 untreated smalls, and to reduce the ash content.

Stainless-steel wedge wire is used for the table bed, in place of the more commonly used perforated plate and woven wire decks.

DEUTSCHE EDELSTAHLWERKE, an affiliate of the West German Thyssen group, is to set up a company in conjunction with Industria Argentina de Aceros (ACINDAR) to manufacture special steels. The company, to be known as Marathon Argentina Aceros Finos y Especiales, will erect works close to the Acindar works at Villa Constitución. The aim is to produce 50,000 tons of special steels a year.

PRELIMINARY PLANS have been completed for the manufacture and distribution of Lansing Bagnall materials handling trucks in the United States. The trucks are to be made in America by the Towmotor Corporation, of Cleveland, Ohio. Under a reciprocal arrangement, Towmotor products will be manufactured at Lansing Bagnall's factory at Basingstoke (Hants) and marketed by Lansing Bagnall in Europe, Africa, and Asia.

Design of Instrument and Control Equipment

DETAILS of a summer school on "The Design of Instrument and Control Equipment for Use in Explosive Environments," to be held at Northampton College of Advanced Technology, St. John Street, London, E.C.1, from June 5 to 9, are now available. The fee for the course is £12 12s., and enrolments must be completed by May 19.

Members of the course wishing to contribute to the proceedings by giving brief accounts of their work, experience, ideas, or problems, or to exhibit interesting equipment will be welcomed. They are invited to contact the organizing lecturer (Mr. L. Finkelstein) as early as possible. Details of the subjects and the lecturers are as follow:—

"The Safety of Instrument and Control Equipment in Mines," by R. Lee (National Coal Board); "The Safety of Instrument and Control Equipment in the Oil and Chemical Industries," by H. Emonds-Brown (British Petroleum, Limited); "The Safety of Instrument and Control Equipment for Use with Explosives," by H. V. Littlewood (Directorate of Safety Services, War Office); "Safety Regulations and Practice Abroad," by N. Elliott (HM Factory Inspectorate); "Intrinsic Safety: the Scientific Basis," by I. Berz (Mining Research Establishment, Isleworth); "Intrinsic Safety: Regulations and Testing," by A. E. Bishop (SMRE, Sheffield); "Flameproofing: Scientific Basis, Regulations, and Testing," by J. Haig (SMRE, Buxton); "The Design of Flameproof Equipment," by C. G. Whibley (A. Reyrolle & Company, Limited, Hebburn); "The Design of Safe Instrument and Control Equipment for Use with Explosives," by J. Fraser (Royal Ordnance Factory, Chorley); "The Design of Safe Instrument and Control Equipment for Mining Applications," by V. M. Thomas (Mining Research Establishment, Isleworth), and L. Finkelstein (Northampton College); "The Design of Safe Instrument and Control Equipment for Use in the Oil and Chemical Industries," by R. J. Redding (Evershed & Vignoles, Limited).

An exhibition of equipment and general discussion will be opened by Mr. A. E. Bennett (Mining Research Establishment, Isleworth) on the closing day.

Coal-fired Turbine

The US Bureau of Mines has awarded a contract to the Allis-Chalmers Manufacturing Company, Milwaukee, Wis., for reblading a 3,750-h.p. experimental coal-fired gas turbine lent to the bureau by the Locomotive Development Committee, Bituminous Coal Research, Inc., and now being installed at Morgantown, West Virginia. Approximately 600 blades made of heat-resistant steel alloy will be inserted. The blades must be able to withstand high temperatures and erosion from coal ash in rigorous experiments aimed at development of a coal-fired turbine.

New Patents

PATENTS below are among the complete specifications accepted listed in the Official Journal (Patents). The numbers given are those under which the specifications have been printed and all subsequent proceedings will be taken.

Applications for copies of the full specifications (3s. 6d. each, post free) should be made to the Patent Office, 25, Southampton Buildings, Chancery Lane, London, W.C.2.

Mining and Mining Appliances

855,585 HEMSCHEIDT MASCHINENFABRIK, H. Hydraulic pitprop.

855,670 SCHWARZ KOMMGES., H. Means for advancing mine supports.

855,838 JOY MANUFACTURING COMPANY. Flexible idler for an endless belt conveyor.

855,917 A.C.E. MACHINERY, LIMITED. Screening, weighing, and bagging installations for solid fuel.

855,990 LOBBERT & COMPANY G.m.b.H. Link linings for mine wall and roof supports.

856,034 ATLAS COPCO A.B. Rock drilling apparatus.

856,062 HILL PORTER (NEWCASTLE), LIMITED, and A. C. TALBOTT. Clamps for fixing attachments to structural sections in mines.

856,076 MANSFIELD AKTIENGESELLSCHAFT FÜR BERGBAU UND HÜTTENBETRIEB. Connections for the frames of mine laggings.

856,094 E. H. BENTALL & COMPANY, LIMITED. Shuttering for use in mines.

856,114 JOY MANUFACTURING COMPANY. Mobile rock drill rigs.

856,115 JOY MANUFACTURING COMPANY. Mobile rock drill rigs.

856,226 BRITISH JEFFREY-DIAMOND, LIMITED. Rotary cutting drums for mining machines.

856,391 MINING & GENERAL ENGINEERS, LIMITED. Wagon retarders.

856,339 MAVOR & COULSON, LIMITED. Bridge conveyor used for mining coal.

856,429 F. G. MITCHELL. Wagon-moving equipment.

856,569 F. W. PAURAT. Articulated shoring for use underground.

856,702 M. WALTHER and J. PRETZSCH. Apparatus for transporting pitprops by gravity from an elevated to a lower level.

856,719 W. E. & F. DOBSON, LIMITED. Mine roof supports.

856,720 W. E. & F. DOBSON, LIMITED. Mine roof supports.

856,761 PREPARATION INDUSTRIELLE DES COMBUSTIBLES. Skips for guided skip hoists.

856,910 MINE SAFETY APPLIANCES COMPANY. Oxygen producing canister.

856,938 GUTEHOFFNUNGSHÜTTE STERKRADE A.G. Hydraulic pitprops.

857,079 CLIMAX ROCK DRILL & ENGINEERING, LIMITED. Drilling machines.

857,251 COAL INDUSTRY (PATENTS), LIMITED. Mining machines.

857,287 MAVOR & COULSON, LIMITED. Mining machines.

857,354 EICKHOFF MASCHINENFABRIK UND EISENGIESSEREI GEB. Cutting machines for mines

857,357 BRITISH JEFFREY-DIAMOND, LIMITED. Plough loader units for mineral-mining machines.

857,397 SCHAFFLER & COMPANY. Firedamp-proof short-delay detonators.

Metallurgy and Engineering

855,532 VAJRAGUPTA, P., and CHOTENUCHIT, P. Low-load blast furnace.

855,544 INTERNATIONAL NICKEL COMPANY OF CANADA, LIMITED. Extraction of nickel and iron from lateritic ore.

855,645 UNITED STATES STEEL CORPORATION. Apparatus for evaluating the physical condition of strip.

855,667 J. B. BRENNAN. Production of degassed metal.

855,847 DEUTSCHE EDELSTAHLWERKE A.G., ALLGEMEINE ELEKTRICITÖTE-G.M.B.H., and STAHL- UND WALZWERKE RASSELSTEIN/ANDERNACH A.G. Method of progressively heating sheet metal, and an induction coil for performing the method.

855,876 COMPTOIR INDUSTRIEL D'ETIRAGE ET PROFILAGE DE METAUX. Extrusion of metals.

855,879 K. GREBE. Conveyor comprising conveyor belt sections driven by an endless chain in a supporting structure.

855,968 AMERICAN METALLURGICAL PRODUCTS COMPANY. Impact resisting low-alloy steel.

856,019 CONSOLIDATED PNEUMATIC TOOL COMPANY, LIMITED. Pneumatically operated percussion drills.

856,020 WESTINGHOUSE ELECTRIC CORPORATION. Ageing treatment for age-hardenable iron-base alloys.

856,095 WOODALL-DUCKHAM CONSTRUCTION COMPANY, LIMITED. Apparatus for cleaning the sealing surfaces of the doors and door frames of horizontal coke ovens.

856,072 R. KELLERMANN. Heat-treating metal.

856,221 UNITED STATES ATOMIC ENERGY COMMISSION. Joining aluminium to stainless steel.

856,299 INDUSTRIE-WERKE KARLSRUHE A.G. Shears for cutting billets, sheets, and bars.

856,424 BRITISH IRON AND STEEL RESEARCH ASSOCIATION. Casting.

856,646 CARPENTER STEEL COMPANY. Alloy steel.

856,838 METALLGESELLSCHAFT A.G. Converting moist, plastic, and greasy ores into lump form on a sintering band.

856,877 DALMINE, S.P.A. Feed apparatus for pilger-type rolling mills.

857,237 ENFIELD ROLLING MILLS, LIMITED. Water-cooled mould for the casting of metals.

857,262 POUR L'INDUSTRIE DE L'ALUMINIUM S.A. Continuous casting of metals.

857,304 FOUNDRY SERVICES INTERNATIONAL, LIMITED. Treatment of molten metals.

857,350 INSTITUTO NACIONAL DE INDUSTRIA. Treatment of iron pyrites ores containing arsenic and lead.

857,366 CRUCIBLE STEEL COMPANY OF AMERICA. Alloy steel.

857,537 ALLMÄNNA SVENSKA ELEKTRISKA A.B. Vacuum melting furances.

Fuel Treatment and Utilization

855,626 SOUTH AFRICAN IRON & STEEL INDUSTRIAL CORPORATION, LIMITED. Production of coking pitch and other products from coal tar.

856,088 COUCH INTERNATIONAL METHANE, LIMITED. Transportation of liquified natural gas.

857,478 SIMON-CARVES, LIMITED. Coal or ore washing.

ARGENTINE GOVERNMENT, Decree No. 841, dated January 30, frees scrap iron (excluding scrap cast iron) and scrap steel for steelworks from exchange surcharges.

African Notes

ISCOR STRIDES ON

2,000,000 Tons Annual Production by June

PRODUCTION of 2,000,000 tons of steel and steel products by the year ending June 30, is the aim of the South African Iron & Steel Industrial Corporation, Limited (ISCOR). This would be more than 250,000 tons above last year's figure—an increase of about 15 per cent. Iscor is now making large strides towards making the Union independent of foreign steel. Last year the company supplied 78 per cent. of total domestic requirements, compared with 72 per cent. in 1958-59, and in the current year, with other steel producers, it will go close to supplying all local needs.

Two large rotor-process steel plants, one at Pretoria, the other at Vanderbijlpark, which have lately come into production, account for much of the increase in output.

Even before it starts its £270,000,000 further expansion programme, which is to mature in 1972, Iscor has begun to think about new export fields. Growth estimates suggest that South African sources alone will buy 4,500,000 ingot tons of steel a year by 1972, but local production by then should be well beyond that figure.

Extensions by Vecor

The Vanderbijl Engineering Corporation, Limited, (Vecor), which recently bought the Duncanville works of Babcock & Wilcox of Africa (Pty.), Limited, is to extend these works at Vereeniging at a cost of more than £500,000. This will increase manufacturing capacity for welded products and pressure vessels by at least two-and-a-half-times. Vecor hopes to have the extensions in use before the end of the year.

One of South Africa's major iron foundries, Durban Falkirk Iron Company, Limited, is to embark on a major group expansion plan involving the company's factories at Jacobs and Newcastle, Natal. Mr. C. S. Steven, chairman and joint managing director of the British group, Allied Ironfounders, Limited, said recently that a new electric element plant would shortly come into operation at Newcastle. This would manufacture elements for the products made by Durban Falkirk, and for supply to the electrical industry in general.

Negotiations have reached an advanced stage for the manufacture in South Africa of atomized ferro-silicon worth about £160,000 annually. The negotiations are between African Metals Corporation, Limited (Amcor), Hoechst, SA (Pty.), Limited, and Knapsack-Griesheim, AG, of Cologne. Amcor already produces ferro-silicon, but this is in block form. Knapsack-Griesheim have the world patent rights for atomized ferro-silicon, and under the agreement Amcor will produce the ferro-silicon under the Knapsack-Greisheim patent. Hoechst, SA, will be responsible for distribution. Atomized ferro-silicon is used for the separation of diamonds from the gravel and in the upgrading of iron ores to give a higher content.

South African Railway's plan to make Port Elizabeth a fully mechanized ore-loading port has been carried a major step further with the placing of an order worth £721,949 for special plant with Robins Conveyors (South Africa) (Pty.), Limited, of Johannesburg. The new plant, expected to be in operation by mid-1963, is designed to off-load trucks and to stockpile ore at the rate of 1,500 tons an hour. Two dumpers or tipplers will be provided with a handling rate of 750 tons per hour each. From the dumpers the ore will be conveyed by belts to the stockpile area, where space will be provided to store about 184,000 tons of ore. Conveyor belts will move the ore to an elevated gallery parallel with the quay, and two ships' loaders will load at a rate of up to 750 tons an hour.

About 2,000 of the first stainless steel window frames made in South Africa are to go into the new Iscor headquarters which are rising on the outskirts of Pretoria. The order is being met by Frederick Sage & Company (SA) (Pty.), Limited, of Johannesburg, with stainless sheet steel imported from the United States. To meet the order, Frederick Sage is turning out the frames at the rate of 250 a week.

Lancashire Steel (Rhodesia), Limited, ended its term as a pilot plant in March and came into full production, making Que Que the centre of an industry which will supply the Federation's total mild steel wire requirements of 12,000 tons a year. Stating that from the end of March the Federation would be self-sufficient in production of most types of wire, Mr. R. P. Gaunt, chairman of Lancashire Steel, said that a large backlog of orders had accumulated, but now the steel shortage was over "we can at last go into full production." With an adequate and assured supply of steel rod, Lancashire Steel has installed extra wire drawing and barbing machines, and a new galvanizing plant which will treble the present output of galvanized wire. Mr. Gaunt said the quality of the Que Que product was well up to that of imported material.

A £600,000 organization, to be known as the Steel Corporation of East Africa, Limited, has been incorporated in Uganda. A site at Jinja has been decided upon, and orders are to be placed shortly for machinery to manufacture steel from scrap metal. It is understood that the Uganda Development Corporation has agreed in principle to participate financially in the project.

Mining industry in Northern Rhodesia set a new production record in 1960. Output was valued at nearly £129,000,000—£9,000,000 higher than the previous year's figure. The record was achieved despite a lower average price. Copper output contributed £121,000,000, or nearly 90 per cent. of the total. Other figures were: Cobalt £2,300,000, zinc £2,700,000, lead £1,000,000, and limestone £500,000.

Coalfield News

Winding Gear Goes from Worked-out Cannock Pit

STEAM-WINDING gear at Cannock Chase No. 3 Colliery (Staffs), from which 20,000,000 tons of coal has been drawn since it was sunk in 1868, has now been removed. The shaft was closed and filled in a year ago when the supply of coal in the area became exhausted, and the pit acts now only as a washing plant for the Cannock Chase No. 8 Colliery.

In 1948 there were 750 men working at the pit and 450 of these worked underground. The colliery was formerly owned by the Cannock Chase Colliery Company, Limited, which at one time owned 18 shafts and one drift. Only three shafts remain, and these are worked by Cannock Chase No. 8 Colliery.

FIRST-AID TEAM of Bedlay Colliery (Dumbartonshire) has won the Fernlea Ambulance Trophy.

THE NCB SEA-BORING TOWER, now working off the coast of Sunderland, is to be towed further north to Marsden during the summer.

PRODUCTION MANAGER, No. 5 (South Barnsley) Area, North-Eastern Divisional Coal Board, Mr. Frank Fairclough opened a new £12,000 welfare hall at Pilley, near Barnsley (Yorks), on Saturday. It is for use of the employees and former workers at Wharncliffe Silkstone Colliery and relaces an 80-year-old club room in the colliery yard.

COAL AND COKE shipments from the South Wales ports to home and foreign destinations last week were at their best level since the Easter Holidays checked operations. A total of 51,906 tons was 12,865 tons better than in the previous holiday week and 16,619 tons above the level in the corresponding period last year which included Good Friday.

CERTIFICATE OF MERIT of the St. John Ambulance Brigade has been awarded to Mr. Fred Ellis (51), a Wombwell miner, who, after having had his leg torn off in a coal-face accident, calmly applied a tourniquet and instructed his mates how to give first-aid treatment. He is a Corps officer in SJAB and has been commended for his "tremendous courage and resourcefulness, though in great pain."

FOLLOWING PROTESTS by Tredegar (Mon), Chamber of Commerce against the closure of the Coal Board's office at Tredegar, Mr. Alfred Robens, NCB chairman, has written saying it is planned to centralize wages offices in each Area, and in the No. 6 Area of the South-Western Division the new central wages offices will be at Six Bells (Mon). There would be no redundancy as a result of the scheme, he said.

IT HAS BEEN decided by the executive of the National Union of Mineworkers to hold a ballot for the post of vice-president, which is vacant through the retirement of Mr. Edward Jones. The result should be known by the next meeting of the executive, in May. There are four candidates: Mr. F. Collindridge, Yorkshire, Mr. R. Main, Northumberland, Mr. Alex Moffat, vice-president of the Scottish Area, and Mr. J. Southall, Midlands.

ALTHOUGH COAL and coke shipments from the Tyne in the first quarter of the year totalled 1,593,734 tons, an increase of 21,403 tons over the corresponding period for 1960, there has been a slackening of shipments over the past two months. Export cargoes in the first three months of this year dropped by 42,369 tons to 130,428 tons and bunker shipments were down by 978 tons to 10,370 tons. Coastwise shipments rose by 64,760 tons to 1,452,932 tons.

West Midlands NCB Raises Output with Fewer Men

DESPITE a decline in manpower, eight productivity records established in the last quarter of 1960 were beaten in the first quarter of this year in the West Midlands Division of the NCB. For the first time, overall OMS in the division reached 30 cwt., an increase of nearly 1 cwt. Coalface productivity rose by more than 1½ cwt. to 94.7 cwt. per manshift.

In the North Staffordshire Area, fractional increases raised the new records to 100.4 cwt. and 29.3 cwt. at the coal-face and overall respectively. The coal-face figure in Cannock Chase Area rose by 2½ cwt. to 94.7 and the overall figure by more than 1 cwt. to 30 cwt. In South Staffordshire and Shropshire Area, overall productivity improved by 1½ cwt. to 28.1. The overall figure in Warwickshire rose by nearly 1 cwt. to 31.6 cwt.

March figures show improvements on several records established in February. In the division as a whole, coal-face productivity rose to 95.3 cwt. Cannock Chase also set two new records of 97.1 and 30.6 cwt., and overall productivity in South Staffordshire and Shropshire rose to 28.2 cwt. per manshift.

Net decline in manpower in the three months under review was 495, against 1,421 in the corresponding quarter of last year, but saleable output, 3,775,000 tons, fell by only 6.4 per cent.

Notts NUM Opposes Psychology Tests for Mine Entrants

STRONG objections to a proposal by the National Coal Board that entrants to the coal industry should have psychological tests to determine their aptitude for the work, have been lodged by Nottinghamshire Area council of the National Union of Mineworkers. Mr. J. Tighe, Area president, said after a meeting of the council last Saturday: "Both at national level and at Nottinghamshire county Area level, the NUM is taking objection to this proposal by the NCB. It aims at introducing psychological tests for new entrants to the mines most of whom are youngsters." Similar feelings have been expressed by the Nottinghamshire miners' council meeting.

A spokesman for the Coal Board said, "We are trying out this kind of test not to weed people out of the industry or to stop them from coming into it, but to find out the potential skills and aptitudes of some of the juveniles coming into it . . . whether these boys are better with their hands or their brains, whether they are potential craftsmen, and so on. If there are any objections to the idea in Nottinghamshire it may be because of a misunderstanding, but the NUM knows about it."

Deputy chairman and joint managing director of William McGeoch & Company, Limited, brassfounders, lamp makers, and manufacturing engineers, of Birmingham, Mr. W. PERCY MCGEOCH has been appointed president of the National Brassfoundry Association, an office his father Mr. William McGeoch, held in 1930. For many years Mr. McGeoch has served on the council of the association, and has been chairman of the Midlands branch, honorary treasurer, and senior vice-president. He is also chairman of the subsidiaries, Verity's (Maxlume), Limited, and Verity's (Switchgear), Limited.

Coal in Europe

ABUNDANCE LIKELY TO PREVAIL

POST-WAR phase of energy shortage which lasted in Europe up to mid-1957 has given way to a phase of abundance and this is likely to prevail for some years to come. This conclusion is reached in a new report—"The Coal Situation in Europe in 1959/60 and Future Prospects" issued by the Secretariat of the United Nations Economic Commission for Europe. The profound structural changes taking place in the European energy balances are common to both east and west and have formed the background to reappraisals made by a number of countries in their coal industry plans.

At the time when the demand for energy exceeded the supply, the greatest possible production of coal was the main target. The reversal as between supply and demand coincided with a marked decrease in prices of forms of energy which were competing with coal from west European areas, in particular fuel oil.

This sudden and radical change in the competitive situation is partly due to inequality in competitive conditions which are frequently regarded as incompatible with the principle of fair competition, the report states. The recession and the pressure of intensified competition led to the sellers' crisis in the west European coal industries and to the elimination of considerable capacity which was not economical according to the new standards.

Planned Fuel Economy

Clearly emerging from the report is the importance of making every effort to prevent a recurrence of the sharp falls in the demand for coal of the magnitude experienced between 1957 and 1959, if confidence is to be restored in the future of the coal industries. However, the need for assuring plentiful supplies of low-cost energy and meeting the competitive requirements of the future is recognized, and, as in the UK, much marginal capacity has been or is being closed down under a programme of planned contraction which will not only guard against prejudicing the industry's capability of meeting the likely long-term demand, but also provide for the social consequences involved.

The report acknowledges that when structural problems are encountered, as at present, State intervention may be necessary for social reasons. Increasing attention is being given to the problems arising from inequalities in competitive conditions between the various forms of energy.

Factory Accident Figures Rise

RISING trend of accidents at work makes exceptionally important this year's National Industrial Safety Conference at Scarborough (Yorks) on May 12-14, at which over 1,000 delegates will be present. Ministry of Labour figures show an increase in non-fatal and fatal factory accidents for 1960, compared with 1959. Non-fatal accidents rose by 15,931 to 189,404, while the figure of 665 fatalities in 1960 shows a rise of 67.

One of the main purposes of the conference, which is organized by the Royal Society for the Prevention of Accidents, is to improve the techniques of industrial safety officers in their struggle to reduce accidents.

Mines Safety Needs More Co-ordination

SOMBRE story with which no one associated with coal mining in North Wales had any right to feel satisfied, is the comment on safety in the mines in 1960 made by Mr. Edward Jones in his last annual report. Mr. Jones, who is a former vice-president of the National Association of Mineworkers, has retired from the post of North Wales Area secretary of the NUM.

He puts forward a three-point plan for greater safety in the mines: Realization by members that they have an individual duty as well as a collective duty, towards safety in the pits; the reporting by members of any malpractice or other incident detracting from pit safety; more effective use of Section 123 of the Mines and Quarries Act, 1954, which provides for inspections on behalf of workmen.

"Risking the displeasure of people engaged in this work," Mr. Jones states, "I must emphasize its great importance in the promotion of safety, both underground and on the surface, and declare quite categorically that some reports of inspections carried out under this section leave much to be desired."

Mr. Jones goes on to deplore that the three unions—the NUM, the National Association of Colliery Overmen, Deputies, and Shotfirers, and the British Association of Colliery Management, were working in "absolute and complete isolation" as far as safety was concerned and asks for a combined exercise by the three organizations to attack with much more vigour the question of safety.

He wanted to see the same determination and enthusiasm to do everything possible to help which was shown after an accident manifest before the accident occurred. "I cannot understand why we do not stimulate sufficient interest to tackle this problem with the determination its urgency and importance demands," he says.

THE WRONG OPERATION of a switch at the Rogerstone works of Alcan Industries, Limited, caused an explosion which resulted in the death of three employees, the Monmouthshire deputy coroner, Mr. D. J. Treasure, was told at an inquest at Newport on Thursday of last week. The chief electrical engineer at the works said than an electric current ignited oil in the switch mechanism, causing a tank to burst, which showered burning oil over the men. The jury returned a verdict of Accidental Death.

Duke Urges Co-operation by Engineers in Commonwealth

APPEAL for greater co-operative efforts by engineers to promote the development of the Commonwealth's natural resources was made by the Duke of Edinburgh in London last week, when he delivered the seventh Graham Clark lecture to a joint meeting of the Institutions of Civil, Electrical, and Mechanical Engineers. During the lecture, which was on "The Engineer in Commonwealth Development," he said, that if the Commonwealth were to make the most of its varied talents, it was essential that the professional institutions should make determined and continuous efforts to keep in close contact with each other.

As an example of the successful co-operation and integration of many specialities, the Duke cited the Durgapur steelworks in India, built by the British consortium, the Indian Steel Construction Company, Limited (ISCON). Owing to the fact that there was such a close relationship between all aspects of engineering in Britain and India, the number of foreign experts necessary to build and equip the Durgapur works was considerably smaller at Durgapur than at the Rourkela (West German) and Bhilai (Russian) steelworks in India.

The Duke said that clearly the contribution which engineers could make to the development of the Commonwealth depended to a large extent upon the organization of the engineering profession both nationally and inter-Commonwealth.

There were four specific ways in which the engineer could implement and influence development: By continually finding practical ways and means of applying scientific principles and discoveries in power, industry, transportation, communications, and construction; by the application of the latest and most efficient methods to individual projects; by the careful administration, maintenance, and improvement of the engineering complex; and lastly by the technical training and education of the next generation of engineers.

Sales and Profits Improvement by BICC in 1960

GROUP sales in 1960 of British Insulated Callender's Cables, Limited, expanded from £128,000,000 to £143,000,000, but the trading surplus is little changed at £9,020,000. Tax charge was £2,593,344 (£2,851,491), and the net profit is up from £3,530,000 to £3,650,000. The addition of exceptional items brings the total net profit up to £4,640,486 (£4,231,569).

The group is maintaining its dividend at 13½ per cent. with an unchanged final of 9½ per cent., and proposes to raise approximately £15,000,000 by issues of debenture stock and ordinary shares. The issues are being made in order to replace short-term borrowing and to provide additional working capital, it is stated. The debenture stock will be offered to the public for subscription, with preferential consideration being given to applications from present holders, and the ordinary will be on a one-for-seven rights basis.

DURING LAST YEAR Austrian industry consumed 2,140,000 metric tons of indigenous coal, or about 40 per cent. of the country's total coal sales of 5,470,000 tons.

Need for Speed in Economic Expansion

NEED for national economic expansion at a greater rate than in recent years, and a warning that if the UK export drive did not develop, steelworkers' jobs might be in jeopardy, were two points stressed by Mr. Harry Douglass, general secretary of the Iron and Steel Trades Confederation, when he spoke at a divisional conference of branch officers of the confederation at Middlesbrough on Saturday.

Mr. Douglass said that the steel industry was maintaining its efficiency and its competitive position, compared with other countries, but we could not allow the European Coal and Steel Community to progress at a faster pace than ourselves.

"The one changing factor in the situation would seem to be that affecting labour," Mr. Douglass went on. "For the first time in my experience, the challenge that continental labour is either cheaper or more productive has lost its force. The fact is that continental trades unions or political pressures, or both, have not only narrowed the margin between workers' total incomes on the Continent and in the UK, but have, in some instances, reversed the situation leaving UK workers with conditions less favourable than those of their continental brothers."

Nuclear Development Group Formed

TO operate in the field of fuels for civil nuclear engineering, a new company called Nuclear Developments, Limited, has been jointly formed by the metals division of Imperial Chemical Industries, Limited, Rolls-Royce, Limited, and the Rio Tinto Company, Limited. The new company will collaborate with the atomic power consortia, and the UK Atomic Energy Authority has been kept fully informed of its formation.

Each of the participants has technical resources, skills and experience which will be appropriate to the venture. The new company expects to be in a position to handle fuel preparation and fuel element manufacture for civil reactors when eventually civil companies are allowed to undertake this work.

AEI Entertains Schoolmasters at School

HEAD teachers and science masters from more than 50 schools and about 20 representatives from organizations connected with education and the electrical industry last week attended a series of lectures arranged by the Associated Electrical Industries, Limited, at Trafford Park. Visits to the company's works included the research department and the apprentice training school. The party also visited the radio telescope at Jodrell Bank.

Lectures were given by Sir Willis Jackson, director of research and education, Mr. C. H. Flurscheim, director and chief electrical engineer, Mr. R. F. Marshall, central education manager, and Dr. D. M. Dodds, manager of the research department at Trafford Park.

ARMSTRONG, STEVENS & SON, LIMITED—Mr. A. E. Clifford has been appointed joint managing director.

IRON AND STEEL TRADE

CONSUMERS are not now faced with the same urgency in issuing their specifications for material as the waiting period is considerably reduced, but there is little doubt, from the orders now reaching producers of structural steel and plate that this promises to be a year of great activity for engineering concerns supplying industrial plant for the iron and steel, chemical, gas, and electricity industries. There is also an accelerating demand from the contracting industries for beams, channels, and angles.

Pig-iron

Pig-iron production, especially in the North-east which is so strongly allied to supplying heavy steel, is being maintained at an unusually high rate. The weekly average of 69,300 tons for the area last month was considerably more than a year ago and maintains its position as the highest iron-producing region in the country. The bulk of the pig-iron is of basic grades and passes directly to the nearby steel plants.

The low phosphorus irons continue in greatest demand, but the combined outputs of the several furnaces producing this grade are more than adequate to satisfy all requirements.

Ferro-alloys

The state of the market is virtually unchanged, a good demand existing for most items. Ferro-tungsten, ferro-molybdenum and ferro-vanadium continue to receive fair support. Both the low and high carbon grades of ferro-chrome and calcium silicide are active, ferro-silicon maintains its interesting position and silicon metal is moving at a steady level.

Ferro-manganese and silico-manganese are in good demand. Ferro-niobium is fairly active and there is a reasonable call on ferro-titanium.

Semi-finished Steel

From a number of re-rollers come reports of a decline in business for small bars, light sections, and strip, and order-books for these products are well below the level of a few months ago. The demand for reinforcing rods and bars, however, is well maintained.

Plenty of mild steel semis are available, but the re-rollers hold good stocks and the call on steelworks is moderate to small. There should be an upturn in demand as stocks are reduced.

Finished Steel

While the demand for sections and joists is still fairly active, there is now much less forward ordering, consumers restricting demand to current rollings. A reasonable quantity of small flats and rounds is being taken up, but there is now capacity in current and forward rollings for suitable specifications for small angles and channels.

So far as bright drawn bars are concerned, orders for good commercial quality are fairly easy to place, but there is still some difficulty in placing those for free cutting and alloy qualities.

CONTRACT has been signed by the Granby Mining Company, Limited, with a Japanese company for the supply of 2,000,000 long tons of iron ore concentrates from its optioned property in the Queen Charlotte Islands off the north coast of British Columbia. The agreement is with Sumitomo Shoji Kaisha, Tokyo, and is worth about $18,000,000.

Ore Chartering

ALTHOUGH rather more miscellaneous business has been effected from the Mediterranean area, there are no signs of any immediate and sustained improvement in demand. On the other hand, tonnage is not offering freely and one or two fixtures have been at slightly better rates. Indian Ore reports Bombay/Constanza at 48s. f.i.o. and trimmed for 10,000 tons June 1/20, and this rate has also been accepted for May 1/25 for similar size. Other ore fixtures include Stockton/Japan, 13,500 tons at $5.25 f.i.o., 2,000/3,000, April 20/May 5, and Karwar/Constanza, 10,000 tons, 5 per cent., at 51s. f.i.o. and trimmed, 1,000 long/1,000 metric, for April 17/30. Otherwise the iron-ore market appears to be quiet with no particular demand in evidence on the open market.

Morphou Bay/Ghent reports 6,500 tons pyrites for May 5/20 at 29s. 6d. on gross terms, but there is still no particular demand from Huelva either to this side or the Continent. Phosphate from Casablanca to Antwerp improved to 21s., but only for a 3,100 tonner early loading. Here again conditions are quiet to the UK.

Toulon Bauxite to Newport has also improved to 21s. for 9,400 tons, April 25/May 10, but there appears to be no immediate further interest.

Sulphur chartering has been resumed from US Gulf or Coatzacoalcos to East Coast UK at 52s. 6d. for 9,800 tons, April 22/May 12, with steamer discharging, and 7,000 tons from US Gulf only to Cork and Manchester for reasonably prompt loading at 55s., same terms.

British Entrants in European Foundry Apprentices Competition

THREE apprentices selected to represent the UK in the Fourth European Foundry Apprentice Competition to be held at Munich from May 15-19 are:—A. Morris, Wallsend Slipway & Engineering Company, Limited; M. J. Rosendale, K. & L. Steelfounders & Engineers, Limited; and E. R. Y. White, Le Grand Western Foundries, Limited. Morris and White are ironfounding apprentices.

In the competition the British apprentices will compete against some 20 boys from eight countries, and will be required to make a casting from patterns chosen by an international jury, and answer written papers in foundry technology, calculations, and technical drawing.

COLLIERY ENGINEERS Norton-Tividale, Limited, Tipton (Staffs), has appointed Commander and Hill, Limited, public relations consultants, of Dudley (Worcs) (telephone: 55136 and 55959), to handle press relations in connection with the company's exhibit at the American Mining Congress Show at Cleveland, USA, in May.

Scotland's New Industries Going Forward on Coal

SCOTLAND'S new steel and motor industries are going forward on coal, which is "fighting back" to give industry a product of higher consistent quality at a competitive price, and the board has now provided an advisory service to consumers on the right way to burn coal in modern plant, said Mr. L. R. Milligan, deputy chairman of the Scottish Divisional Coal Board.

MR. L. R. MILLIGAN

Presenting prizes to students at Cowdenbeath Technical College recently, he said there was a great future for the qualified engineer in Fife as a mining centre. Mechanization was spreading fast, and power-loading in Fife had attained a higher percentage of output by these methods than any other Area in the country, with the exception of one. The board was this year offering vacancies for 700 juveniles and would need many more in subsequent years. The jobs were permanent, and the offer included opportunities for the finest apprenticeship training and general mining training to be found anywhere.

Praising the work of the college, Mr. Milligan said there were now 1,000 students attending day classes and another 1,000 attending in the evenings. Many of these students were on day-release from collieries. The college had a long list of distinction and special mention passes, and a Bronze Medal last year in the City and Guilds examination in Colliery Mechanical Engineering. In addition to the main courses in mining, mechanical, and electrical engineering, the college provided first-year basic training for NCB apprentices, and was the only technical college undertaking the training of mining entrants.

Coal Chartering

EFFECT of the demand for tonnage to load scrap for account of Japanese receivers has been felt on the coal market. Rates for prompt positions have hardened considerably, with Hampton Roads/Rio paying $6.50 for 14,000 tons for end April, which rate is indicated for May, and for June 5/30 13,500 tons obtained $6.00. Inquiry is maintained.

In the case of Hampton Roads/Japan, a 23,000 tonner has been fixed at $7.45 for five consecutive voyages commencing June, 13,000 tons for April/May at $8.90, and similar size for May 1/20 at $9.00. Inquiry is maintained for most positions. In the case of Italy, 11,500 tons for Savona was fixed for very prompt loading at $4.10, followed by 13,500 tons also April to West Italian Range at 10 cents extra, and 11,000 tons for second half May, also to West Italian Range, at $4.25.

There is no particular demand from the UK, although tonnage could probably be worked subject to stem down to the Mediterranean area.

Clean Air Experts See New Washery Plant

BEFORE their annual meeting at Morpeth (Northumberland) last Friday, when they were welcomed by Mr. Leslie Graham, chairman of the Northern (N&C) Divisional Coal Board, members of the North-East Divisional Council of the National Society for Clean Air visited the Stones washery plant at Ashington Colliery and inspected the new central workshops.

The Stones washery plant is the first to be constructed to remove coal from the run of mine shale. Tests had shown that the run of mine shale at Ashington contained recoverable coal in sufficient quantities for the process. The plant has a capacity of 60 tons per hour and the shale is first put through a crusher which reduces it to below 6 in. in size. It then passes through a specially designed Baum jig which separates the coal from the shale, the coal then going to the Ashington central washery for further washing and grading, the shale going to the colliery heap free of coal.

In 1960, the plant recovered 22,000 tons of saleable coal, which would otherwise have gone to waste, and in so doing reduced the possibility of combustion on the colliery heap. The process has proved a success. Further tests in the coalfield have established another site where conditions are suitable and plans for a second plant are well advanced.

The central workshops provide maintenance and repair facilities for the Northumberland and Cumberland coalfields and the expanding No. 3 Area with its highly mechanized collieries.

The divisional engineering and mechanization training centre is based at the workshops. Its main object is to provide intensive training courses for apprentice mechanics and electricians, but there are also refresher courses for journeyman mechanics and electricians, and for under-officials and young men enrolled in the board's management training schemes for mining, mechanical and electrical engineers.

Later, members of the Council heard a talk on "Coal and the Clean Air Act" given by Mr. J. S. Williams, deputy director-general of marketing, National Coal Board, and chairman of the publicity committee of the Coal Utilization Council.

Hugh Wood Profit Better Than Expected

MINING machinery and equipment manufacturers, Hugh Wood & Company, Limited, of Gateshead (Co. Durham), reports a pre-tax profit of £577,362 for the year to October 31, 1960, and is paying a final dividend of 6 per cent. These results compare with the estimate of a minimum profit of £450,000 and a 4 per cent. final payment given when the company was made public last September. The 1958-59 profit was £690,685.

After tax of £300,612 (£338,346) the 1959-60 net profit balance is £276,750 against £352,339 for the previous year. The September information statement pointed out that the group was to a large extent dependent on orders from the National Coal Board and that it was impossible to forecast the number and extent of these from year to year. However, the directors considered it was reasonable to expect a minimum future average profit of £250,000, before tax, with, on that basis, an 8 per cent. dividend.

THE COAL TRADE

CONSIDERABLE variation in trade from district to district is now reported as the time for summer prices approaches. A steady flow of orders for small quantities is noted in some places, but where there was a marked rise in post-Easter ordering, the fluctuation has been greater and trade has dropped to such an extent that merchants are asking for allocations to be curtailed in order that they can deal with arrivals. The industrial situation shows no great variation and the call for hard steam coals is maintained at a reasonable level.

SOUTH WALES

A contract for 500,000 tons of Welsh coal has been concluded with France. This is almost three times as much as Britain shipped there last year. About half the contract will be in anthracite duff (small coal) which is used for briquette making. France was formerly a leading market for British coal, the majority being shipped from South Wales. Before the war annual shipments amounted to 6,000,000 tons, but last year exports were down to 173,000 tons.

Warmer weather and the approach of summer prices probably accounts for the slump in demand for domestic coals, and anthracite, dry steam boiler fuels, and Phurnacite are all much easier to obtain. The demand for coke has been most affected by the falling off in orders.

Industrial demand remains steady, except for the normal drop in solid fuel used for space heating.

NORTH WALES

Demand for coal is extremely quiet, and most merchants are only ordering very small tonnages to tide them over until the advent of summer prices. All grades of coal are on offer, and supplies are promptly despatched. The call for coke is very limited, and inquiries for premium smokeless fuels is moderate and customers are experiencing no difficulty in getting prompt deliveries.

Present contracts for anthracite and Phurnacite are being extended for a further six months to November 1. Most traders have placed orders for both these fuels for despatch after May 1, thus availing themselves of every opportunity to stock during the summer months.

Industrial requirements continue to be catered for satisfactorily.

More British Coal for West Germany

DURING February British coal exports to Federal Germany amounted to 38,200 metric tons, compared with only 13,100 tons for the previous month, and despite a fall in total West German coal imports over the month from 693,600 tons to 589,000 tons. Imports of coal from ECSC member countries fell from 145,500 tons to 116,400 tons and those from the US from 386,100 tons to 268,600 tons.

West Germany exported in February some 2,430,000 tons, or 100,000 tons less than in January. Main customers remained France, Holland, and Luxembourg, all of which however took less than in January. By the end of January West German coal stocks dropped by 553,000 tons to 8,370,000 tons.

Drain on Coal Stocks Continues

UNDISTRIBUTED coal stocks, which looked as if they might stabilize themselves at just above 23,000,000 tons, dropped again slightly, and in the week ended April 8 were only 12,000 tons above the 23,000,000-mark. As consumption that week at 3,517,000 tons was well above production (2,729,800 tons), stocks should drop still further before beginning the summer build-up.

Output last week at 3,988,200 was only just below the comparable week last year and some 200,000 tons above the average for the year so far.

There were 577,690 wage-earners on colliery books on April 8, against 612,630 on April 9, 1960, the numbers engaged at the coal face being 216,930 and 235,510 respectively. Total absenteeism (all workers) in the week ended April 8, was 15.92 per cent., compared with 13.69 per cent. in the week ended April 9, 1960. Output at the face was 3.933 tons and overall 1.318 tons in the week ended April 8, compared with 3.976 and 1.430 tons in the week ended April 9, 1960.

The following table gives (in tons) the revised output of saleable mined coal by division in the week ended April 15, and the tonnage lost through all causes (holidays, disputes, and go-slows):—

Division.	Week ended April 15, 1961.		Week ended April 9, 1960.*
	Total output.	Tonnage lost.	Total output.
Scottish ..	360,000	9,000	370,000
Northern (N&C) ..	246,000	2,000	244,000
Durham ..	472,000	—	471,000
North-Eastern ..	839,000	13,000	866,000
North-Western ..	248,000	1,000	281,000
East Midlands ..	901,000	4,000	942,000
West Midlands ..	281,000	1,000	305,000
South-Western ..	377,000	11,000	414,000
South-Eastern ..	28,000	—	31,000
Great Britain—			
Deep-mined coal ..	3,752,000	41,000	3,924,000
Other deep-mined (including licensed mines) ..	39,000	—	46,000
Opencast coal ..	197,000	—	162,000
TOTAL	3,988,000	41,000	4,132,000

* Comparable week last year.

PHOENIX ASSURANCE COMPANY, LIMITED—Mr. C. R. Wheeler, president of the British Iron and Steel Federation, and Mr. Ronald H. Senior, a director of Senior Economisers, Limited, have been appointed to the board. Mr. Wheeler is vice-chairman of Associated Electrical Industries, Limited, and holds a number of other board appointments.

Board Changes

Mr. Hugh T. Weeks Joins Board of Hadfields

FOLLOWING his resignation as deputy chairman and from the board of Truscon, Limited, at the end of last year, Mr. Hugh T. Weeks has been appointed to the board of HADFIELDS, LIMITED, steelmakers of Sheffield. He is a director of Finance Corporation for Industry, Limited, and the Industrial & Commercial Finance Corporation, Limited.

Before his appointment to Truscon (then the Trussed Concrete Steel Company, Limited), in 1951, Mr. Weeks was one of the joint controllers of the Colonial Development Corporation, which he joined in 1948 as Controller of Plans.

LEEDS FIRECLAY COMPANY, LIMITED—Mr. R. G. Parker has been appointed a director.

FODENS, LIMITED—Mr. A. Stubbs has been appointed chairman to succeed Mr. J. Wild who has resigned from the board.

CAPE ASBESTOS COMPANY, LIMITED—Mr. R. H. Dent has been elected deputy chairman of the company. He continues as joint managing director.

PACKMAN MACHINERY, LIMITED—Mr. D. H. Byles has been appointed a director of the company, which is a subsidiary of Baker Perkins, Limited.

WHESSOE, LIMITED—Mr. John H. Lord has joined the board. He is a director of Dunlop Rubber Company, Limited, and G. & J. Weir (Holdings) Limited.

ROBERT DEMPSTER & SONS, LIMITED—Mr. B. C. Morton, who has been managing director since 1942, has also been appointed deputy chairman of the company.

BURTONWOOD ENGINEERING COMPANY, LIMITED—Brig. C. J. Tobin has been appointed to the new position of works director. He has also been appointed to the board as from May 15.

BLACKSTONE & COMPANY, LIMITED—Mr. E. Joyce and Mr. Charles Pratt have retired from the board. Mr. Joyce joined the company in 1904 and became a director in 1947. Mr. Pratt joined the board in 1936.

C. H. BAILEY, LIMITED—Mr. C. A. Winn is retiring as joint managing director, but will remain a director. Mr. M. R. L. Hayes is to join the board and at a later date will become general manager of the company.

M-O VALVE COMPANY, LIMITED—Following the retirement at the end of March of Mr. G. A. Marriott, Mr. J. Bell has been appointed managing director of the company, a subsidiary of the General Electric Company, Limited.

ASSOCIATED ELECTRICAL INDUSTRIES (RUGBY), LIMITED—Mr. H. E. Cox, who was appointed deputy director of manufacture on January 1, now becomes director of manufacture following the recent retirement of Mr. H. L. Satchell.

TOLEDO WOODHEAD (SPRINGS), LIMITED—A director since March, 1946, Mr. Harry Spittlehouse has been appointed managing director jointly with Mr. Frank Woodhead. Mr. Geoffrey Cozens has been appointed an additional director.

FAIRFIELD SHIPBUILDING & ENGINEERING COMPANY, LIMITED—Mr. D. B. Kimber, shipbuilding manager, has been appointed a director. Mr. James Lenaghan, managing director, has been appointed a director of David Rowan & Company, Limited.

NEATH STEEL SHEET & GALVANIZING COMPANY, LIMITED—Mr. E. Waldo Lewis has been appointed a director of the company. For many years he has been general manager of the Llanelly Steel Company (1907), Limited. Both companies are subsidiaries of Duport, Limited, Tipton (Staffs).

J. PARKINSON & SON (SHIPLEY), LIMITED—Mr. Harry Parkinson has become chairman and sole managing director of the company, a subsidiary of Crofts Engineers (Holdings), Limited, following the retirement of Mr. Edward Parkinson, who was chairman and joint managing director. Mr. T. Staron has been appointed a director of the company.

WILLIAM DENNY & BROS., LIMITED—Mr. Edward L. Denny, the chairman, is to retire at the annual meeting on May 17, and it is the board's intention to ask him to become president of the company. Mr. W. D. K. Marshall will succeed Mr. Denny as chairman and Mr. F. R. Topping will become deputy chairman in succession to Mr. Marshall. Mr. C. F. Morris has been appointed a director of the company.

Broken Hill Boosts Ingot and Rolled Products Output

HEAVY demand for the company's products has been experienced in the past six months, states the chairman of the Broken Hill Proprietary Company, Limited, of Australia, Mr. Colin Y. Syme, in his supplementary report for the year 1960-61. Although output of ingot steel for the half year to November was 7.1 per cent. higher than in the previous half year, continued upsurge in demand meant that the company was unable to meet in full customers' requirements. There were now, however, signs that demand was levelling out, and since increasing capacity was becoming available from the expansion programme, steel users had been advised to consult with the company before undertaking further importations.

Further substantial increases in production were achieved during the six months ended November last by Broken Hill and Australian Iron & Steel Pty., Limited. Coal production increased by 21 per cent. to 1,943,960 tons, coke production by 11 per cent. to 1,253,337 tons, pig-iron output by 12 per cent. to 1,461,593 tons, and steel ingot by 7.1 per cent. to 1,838,002 tons. There were commensurate increases in rolled products, both Newcastle and Port Kembla steelworks achieving new record outputs of blooms, slabs, merchant sections, plate, strip, skelp, structural steel, and tinplate. Further developments at both works should make possible in the near future output of ingots at an annual rate of 4,000,000 tons, it is stated.

The nominal capital of the company has been increased from £100,000,000 to £150,000,000 by the creation of 50,000,000 shares of 20s. each.

Roundabout Journey for Roll Housings

MANUFACTURE of the 68-in. continuous hot strip mill for the new Spencer Works of Richard Thomas & Baldwins, Limited, at Llanwern, near Newport (Mon), is continuing to schedule in the works of the builders, Davy & United Engineering Company, Limited, a member of the Davy-Ashmore group.

All the 24 roll housings for the new hot mill are having to be transported by road from Sheffield over a circuitous route via Huddersfield, Oldham, Manchester, Stafford, Wolverhampton, Worcester, Ross Spur, and Abergavenny, a total of 270 miles, against the normal road distance between Sheffield and Newport of 180 miles.

Company News

NEW FUNDS FOR HADFIELDS

Nine-Company Group Subscribing £2,600,000

GROUP of nine industrial and financial companies is to provide £2,616,184 of new capital for Hadfields, Limited, the Sheffield special steel manufacturers and engineers, by subscribing for that number of £1 ordinary shares at par. The group is headed by Sir Peter Roberts, MP, chairman of the Wellman Smith Owen Engineering Corporation, Limited, and Newton, Chambers & Company, Limited, two of the industrial members, which will each provide about £400,000. There are three other industrial members, including Barrow Barnsley (Holdings), Limited, which will supply some £250,000.

The industrial companies will supply half the new capital and the remainder will be subscribed by Securities Agency, of which the chairman is Mr. Harold Drayton, and which has boardroom connections with Newton Chambers.

Under the scheme, Hadfields ordinary capital will be raised to £6,500,000, and the group, acting as a consortium, will have a 41 per cent. holding in the increased equity. Sir Peter Roberts will become vice-chairman of Hadfields, and four other members of the group may join the board. Dividend earnings of the company have declined from 24 per cent. five years ago to 5 per cent. last year. The Millspaugh, Limited, paper machinery subsidiary is still making a loss, and no improvement in group profits is expected in the year ending this September.

Acceptance Urged

Lord Dudley Gordon, chairman of Hadfields, urging shareholders to accept the proposals at an extraordinary meeting to be called as soon as possible, states that the board considers the close association with the industrial members, the addition of new capital, and the reinforcement of management, will all be of benefit to the shareholders and employees. For some time the board has been concerned with the need for additional finance for modernization and development and for increased working capital.

At a Press conference in London on Wednesday, Lord Dudley Gordon said that the link with the industrial members of the group would allow a useful exchange not only in manufacture but also in know-how and research. It was intended that Millspaugh should be as fully integrated as possible with Hadfields.

Sir Peter Roberts stated that talks on the proposal began early this month when Hadfields ordinary shares stood at 18s. 6d. A suggested price of par seemed a reasonable value. He thought it might be three to four years before the full effects of the intended arrangements and planned developments would be seen.

It was not intended at this stage to seek a Stock Exchange quotation for the new shares.

CHAMBERLAIN & HILL, LIMITED, ironfounders, of Walsall (Staffs)—An extraordinary meeting is called for May 4 to create capital and to effect the one-for-one scrip issue to holders of April 22.

HARLAND & WOLFF, LIMITED, shipbuilders, of Belfast—The ordinary dividend for 1960 is to be halved to 5 per cent. Group net profit, after a substantially lower UK tax charge, dropped to £246,798 (£514,462).

HUNSLET (HOLDINGS), LIMITED—The whole of the issued share capital in Materials Handling Equipment (Great Britain), Limited, suppliers of side operating fork lift trucks, of Maidenhead, has been acquired for £21,500 cash.

BELLS ASBESTOS & ENGINEERING (HOLDINGS), LIMITED—The final dividend of 15 per cent. on capital enlarged by a two-for-five rights issue makes an increase of 2½ per cent. over the forecast final. Group pre-tax profit rose to £737,193 (£580,009).

GLOVER & MAIN, LIMITED—Group profits, including those of the newly-acquired subsidiaries, fell sharply in 1960 to £282,563 (£432,930). The final dividend is held at 9d. per 10s. share on capital increased by a one-for-three rights issue, making 11d. per share as previously.

DOWDING & MILLS, LIMITED, electrical engineers, of Birmingham—The company is raising its interim dividend from 12½ per cent. to 16⅔ per cent. On present indications the directors expect the profit for the year ending June will be at least 25 per cent. more than for the previous year.

BABCOCK & WILCOX, LIMITED—Group profit, before tax, shows an improvement at £890,584, against £523,154, but there is a charge of £157,944 for UK tax, against the previous year's credit of £150,137. A final dividend of 4½ per cent. maintains the total for 1960 at the reduced 9 (13) per cent. rate paid for 1959.

SPIRAX-SARCO ENGINEERING, LIMITED, holding company of manufacturers of steam and heat control equipment, of Cheltenham (Glos)—Group profits expanded from £352,700 to £417,354, and after tax there is a net profit of £202,920 (£175,681). Final dividend of 18 per cent. raises the total by 4½ per cent. to 27 per cent.

BARTON & SONS, LIMITED, tubing and conduit manufacturers, of Dudley (Worcs)—Group profits of £1,135,113 for 1960, compare with £1,044,315 and, after tax, the net profit is £587,971 against £545,217. The dividend is raised by 2½ per cent. to 20 per cent. with a final of 12½ per cent. and a one-for-four scrip issue is proposed.

ALLEN WEST & COMPANY, LIMITED, electric control and switchgear manufacturers, of Brighton—Final dividend is recommended of 8½ per cent., making 13½

per cent. for the year ended January 31, against 12½ per cent., plus a bonus of 1 per cent. Group profit for the year was £407,485 (£408,168), after tax of £242,595 (£241,132).

PYRENE COMPANY, LIMITED, makers of fire-fighting equipment, of Brentford (Middx)—The dividend is raised by 2½ per cent. to 30 per cent. for 1960 with a final of 18¾ per cent. Group profits increased to £755,825 (£701,528), and after tax of £368,067 (£319,552), net profit is £387,758 (£381,976). Details will be announced later of a proposed one-for-seven rights issue.

PRESSED STEEL COMPANY, LIMITED, Cowley (Oxon)—Group profit in 1960, before tax, fell to £2,925,061 (£4,829,085), but, with a final of 21 per cent., the dividend is maintained at 30 per cent. on increased capital. This is as forecast with the May rights and debenture conversion issues. After a reduced tax charge of £1,052,534 (£2,367,579) the net profit is down to £1,872,527 (£2,461,506).

JOSIAH PARKES & SONS, LIMITED, manufacturers of locks and brassfoundry, of Willenhall (Staffs)—Consolidated profit for the year is increased to £360,158 (£336,447). The chairman, Mr. C. W. Parkes, states that all indications are of a continued high level of demand. He deprecates any tendency towards inflation of price levels as a further handicap in the already hazardous export field.

DANIEL ADAMSON & COMPANY, LIMITED, engineers and boiler makers, of Dunkinfield (Ches)—Indications are that all measures being taken by the parent company, in conjunction with a full order-book, will stabilize the position in 1961. Group orders on hand are worth £2,150,000, which is the highest for three and a half years, and are fairly spread among the main products and industries supplied.

MARTIN, BLACK & COMPANY (WIRE ROPES), LIMITED, wire rope manufacturers, of Glasgow—Final dividend of 12½ per cent. makes 17½ per cent., for 1960, compared with a minimum forecast of 15 per cent. The 1959 payment, on which the interim was prior to rights and scrip issues, was equivalent to 14 per cent. taking the scrip issue only into account. Net profit was £129,517 (£104,629), after tax of £114,314 (£105,239).

BRITISH ROPES, LIMITED, steel wire rope manufacturers, etc., of Doncaster—Group profits for 1960 are higher at £2,700,798 compared with £2,543,425, and after taxation of £1,410,392 (£1,374,262) the net profit is £1,410,392 (£1,374,262). A final dividend of 7 per cent. makes 10 per cent. for the year on capital increased by one-for-one scrip and one-for-eight rights issues. Taking the scrip issue only into consideration, the equivalent payment was made for 1959.

DARWINS GROUP, LIMITED, holding company for manufacturers of high grade steels, castings, magnets, tools, etc., of Sheffield—Trading profits rose from £444,217 to £617,250 in 1960 and the dividend is raised 3½ per cent. to 16 per cent. The final dividend is 10 (8½) per cent., and the year's total is on a capital increased to £1,003,750 by a one-for-four rights issue. After all charges, including tax, there is a net available balance, including that brought in, of £470,462 (£386,901).

BIRFIELD, LIMITED, general engineering suppliers, of London, W.1.—Sales in the six months ended January 31, 1961, totalled £14,045,000 (£11,988,000), and net trading surplus improved from £1,013,000 to £1,541,000, after deduction of all trading outgoings including depreciation, but before providing for taxation and reserve for increased replacement cost of fixed assets. Stock and work in progress at January 31, 1961, was not physically examined, and to this extent profit figures must be regarded as approximate, it is stated.

Record Production Year by British Rollmakers

PLANTS of the British Rollmakers Corporation, Limited, worked to capacity during 1960, and production was a record, states Mr. Evan AG. Norton, chairman, in his annual report. Production would have been even greater, but for the higher quality demanded which required augmentation of heat treatment capacity to a greater extent than normal expansion would have required. The new year had started well, and he had every confidence of being able to present a good report in 12 months' time.

Capital outlay during 1960 was almost £800,000, and the year-end commitments were £560,000, which were adequately covered by liquid resources. It is proposed to capitalize £621,317 and to distribute 621,317 new fully paid ordinary shares in the proportion of one new ordinary share for every four ordinary shares now held. This in itself, says the chairman, will in no way increase the amount available for distribution in the future by way of dividends.

In view of the present high price of the ordinary shares, the subdivision of each £1 ordinary share into four ordinary shares of 5s. each is recommended.

Law Cases

CONCESSIONARY COAL THEFTS

FINES totalling £222 were imposed on 24 lorry drivers at Mansfield Magistrates' Court for stealing miners' concessionary coal which they were supposed to deliver. It was stated that despite all precautions taken by the NCB and by the haulage firm employing the men, miners had been systematically deprived of coal allowances. The method had been either that of short deliveries or by the deliberate spilling of coal, which was then rebagged and sold by the defendants.

A number of the men said they fell to temptation because they did not get a living wage. The defendants, in pairs and in groups, admitted 19 coal stealing offences committed over a period of months. Some asked for further thefts to be taken into consideration. A club steward admitted buying some of the coal and selling it at a profit to customers, and was fined £25 on receiving charges. He also asked for further offences to be taken into account.

THEFT OF 10-TON COAL LOAD

AFTER admitting stealing a 10-ton lorry load of coal from Woodthorpe Colliery, and asking for a charge of obtaining £20 by false pretences to be taken into consideration, Frank Thomas Reynolds (38), lorry driver, was sentenced to 12 months' imprisonment at Chesterfield County Magistrates' Court.

At the time of the offences, Reynold was on probation for two previous theft offences, and his sentence included three months' imprisonment on each of these charges.

PLEADING GUILTY to permitting dark smoke to be emitted for a continuous period of 30 minutes from an engine shed at Grimesthorpe motive power station, Sheffield, the British Transport Commission was fined £3 at Sheffield.

DAMAGES OF £150 and costs were awarded against Associated Electrical Industries, Limited, at Monmouth County Court, to Mr. Hugh Robbins, who was employed at the firm's Lydbrook (Glos), factory and injured his ankle in an accident at the works.

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AP 81

Orders Placed

Large Pipe Contract for S. Durham Steel & Iron

SINCE the beginning of the year, South Durham Steel & Iron Company, Limited, has secured, against intense competition from both European and Canadian mills and involving prompt delivery dates, contracts for 180 miles of steel pipe of a range between 24 in. and 30 in. diameter worth over $6,000,000.

The principal contract, worth $3,000,000, is for 100 miles of 30-in. pipe for the Oasis Oil Company for development of the new oilfields in Libya. There are also two contracts for Alberta and British Columbia amounting to 5,200 tons, and two amounting to 7,000 tons for the Middle East. The orders will enable regular working to be maintained at the 40-ft. pipe plant at Stockton for the next three and a half months.

CONTRACT FOR the supply, fabrication, and delivery of steel works for eight bridges in the Midland Region, has been awarded by British Railways to the Butterley Company, Limited.

CONTRACT HAS been awarded by the Tyne Improvement Commission to George Cohen Sons & Company, Limited, for the supply of a 7-ton static tower crane at its Howdon repair yard.

CENTRAL AMERICA'S first refinery under construction near Colon, Panama, is to be equipped with electronic instrumentation supplied by the American associates of Honeywell Controls, Limited, Greenford (Middx).

PAKISTAN GOVERNMENT has ordered 200 automatic voltage regulators, worth about £50,000, from Brentford Transformers, Limited, Crawley, for the Director General of Supplies and Disposals, Karachi.

ENGINEERING WORK at a new extension to the bottling plant of James Hole & Company, Limited, Newark-on-Trent (Notts), is to be undertaken by the Worssam Products division of Vickers-Armstrongs (Engineers), Limited.

SUPPLY AND CONSTRUCTION of 24 floating and fixed roof oil storage tanks for the new Esso petroleum terminal at Tynemouth is to be undertaken by Redheugh Iron & Steel Company, Limited, Gateshead. The contract is worth about £170,000.

WORTH £20,000, an order has been placed with Braithwaite & Company, Engineers, Limited, constructional engineers and bridge builders, of London, S.W.1, by the Uganda Ministry of Works, for prefabricated steelwork to form the superstructure of a new bridge over the River Nile.

BELGIAN CONTRACT awarded jointly to Sovex, Limited, conveyor manufacturers, of Erith (Kent), and its agent Briquet-Romain, of Lobbes, is for a track-haulage conveyor system, over a mile long, for installation in the new central warehouse now being built in Brussels for the House of Groothuis, chain store merchants.

CONTRACT WORTH £46,000 by the English Electric Company, Limited, for the supply of two de-aerators for Blyth "B" power station has been awarded to William Boby & Company, Limited, water treatment engineers, of Rickmansworth (Herts). The plants will each de-aerate 2,250,000 lb. of feedwater per hr.

AN ORDER has been received by Honeywell Controls, Limied, Greenford (Middx), from the Continuous Casting Company, Limited, for the complete instrumentation of a twin-strand continuous casting machine to be installed at the Abbey Works of the Steel Company of Wales, Limited. The machine will control and record the flow of cooling water and lubricant at various points, and will monitor certain local flows and also record and integrate the casting speed and record temperature rises across the moulds.

ORDER HAS BEEN placed by British Insulated Callender's Cables, Limited, with B. & F. Carter & Company, Limited, Bolton, for machinery for wrapping and reinforcing the BICC "Magna" flexible natural gas pipeline which is to be laid across the Georgia Strait from the British Columbia mainland to Vancouver Island, Canada.

FOLLOWING AN intensive export sales promotion campaign by Mr. A. H. Hounsell, general sales manager of Michigan (Great Britain), Limited, a contract to the value of £300,000 has been obtained from the Highways Department of the Yugoslav Government for the supply of British-built Michigan scrapers, tractor dozers, and tractor shovels.

ASSOCIATED ELECTRICAL INDUSTRIES, LIMITED, is to receive an order worth more than £400,000 from the Central Electricity Generating Board for two 400-mVA generator transformers for connection to the supergrid at the Drakelow "C" power station, near Burton-on-Trent. The largest generator transformers so far ordered by the CEGB each will weigh 270 tons when fully assembled.

ORDERS FOR 5 miles of 285,000-V pipeline compression cable, the largest installation at this voltage in the UK, and 15 miles of 132,000-V compression cable have been placed by the South of Scotland Electricity Board with Enfield-Standard Power Cables, Limited. The 285,000-V cable will supply the new Ravenscraig steel strip mill which is being built by Colvilles, Limited.

MACHINE TOOL manufacturers of Heckmondwike (Yorks), T. S. Harrison & Sons, Limited, a subsidiary of the Brooke Tool Manufacturing Company, Limited, has received an order worth about £150,000 from West Germany's metalwork industry, for 360 lathes to be delivered next year. Harrison & Sons have already received a £50,000 order from West Germany for delivery this year.

ORDER FOR diesel-engined tipping truck chassis worth £95,000 has been placed with the Ashok Leyland, Limited, main distributor for West Bengal and Bihar, Associated Indian Enterprises, Pvt., Limited, by Bird & Company, Limited, Calcutta. A total of 38 Leyland Comet 9 ft. 10 in. wheelbase chassis have been ordered, for use in carrying iron ore and other raw materials to the steel projects at Durgapur, Rourkela, and Jamshedpur.

ONE OF THE Stone-Platt, Limited, group of companies, Hayward Tyler & Company, Limited, pumpmakers and brassfounders, of Luton (Beds), has been awarded a contract worth about £50,000 by Simon-Carves, Limited, for eight low pressure and eight high pressure glandless circulating pumps for the nuclear power station which the General Electric Company, Limited and Simon-Carves are constructing for the Japanese Atomic Power Company at Tokai Mina.

MORE EXPORT ORDERS are announced by Thomas Smith & Sons (Rodley), Limited, Yorkshire manufacturers of cranes and excavators. In addition to four excavators ordered within the past few weeks for Switzerland, another five have been ordered and from North Borneo has come a repeat order for a ME11 truck-mounted 15-ton crane. An order for three excavators for New Zealand brings the total number of Smith machines in New Zealand to more than 170.

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Irish Trade Boosts Coal Sales of Settle Speakman

TONNAGES of coal and manufactured fuels handled in 1960 by the parent company and its four retail subsidiaries showed an increase over those for 1959, states Mr. W. H. Carroll, chairman of Settle Speakman & Company, Limited, coal shippers, etc., of Stoke-on-Trent. Shipments to Eire and Northern Ireland showed a welcome increase, although British coal still had some ground to regain in this market in face of competition from American, Polish, German, and Belgian coals.

At the company's limestone quarries in Derbyshire there had been a steady demand from steel and general industries, and sales tonnages had in total equalled those of 1959. The industry had, however, been faced with considerably increased costs. The cost of lime production was greatly affected by the general increase in the price of coal and coke in September, and the higher wages for quarrymen. Much of these increased costs could not be recovered immediately by price adjustments, and the results for the second half of the year were disappointing.

The company's bank indebtedness had increased considerably as a result of the purchase of further subsidiaries, and there were considerable capital commitments for the development of quarries. The board will continue to follow a development policy designed to increase the profitability of the group's activities in various fields, says Mr. Carroll, and where appropriate diversify its activities and strengthen its financial structure.

UIE Meeting to Prepare Next International Congress

ANNUAL meeting of the executive committee of the Union Internationale d'Electrothermie (UIE) opens in London on Monday and will last until Thursday, April 27. It is the first time a UIE meeting has been held in the UK. Formed at the conclusion of an International Congress of Electro-Heat in Paris in 1953, the UIE now has a membership of 14 mainly European countries. The UK member is The British National Committee on Electroheat, the secretariat of which is provided by the British Electrical Development Association.

Main business of the meeting, which will be held in the offices of the Electricity Council at Winsley Street, W.1, will be the preparations for the 5th International Congress to be held in Wiesbaden, Germany, in the autumn of 1963, at which papers will be presented by experts covering the whole field of electric heating in industry. To promote fuller discussion, the papers at this congress will be limited to 120, including 20 from non-member countries such as the USA and USSR. It has already been agreed in principle that the 6th congress, in 1967 or 1968, will be held in the UK.

Delegates to the meeting will also tour part of the Midlands as guests of the Midlands Electricity Board, and visit the works of Garringtons, Limited, at Bromsgrove.

ONE-DAY CONFERENCE will be held by the British Institute of Management at the Connaught Rooms, London, on Tuesday, May 16, on "Public Relations in Marketing."

Increases of Capital

BRASS FOUNDERS (SHEFFIELD), LIMITED, increased by £50,000 in £1 founders shares, beyond the registered capital of £50,000.

A.J.W. PRECISION MACHINERY, LIMITED, Ashford (Middx), increased by £1,400 in £1 shares, beyond the registered capital of £100.

HALLAMSHIRE STEEL COMPANY, LIMITED, Sheffield, increased by £25,000 in £1 ordinary shares, beyond the registered capital of £375,000.

PRESSED STEEL COMPANY, LIMITED, Cowley, Oxford, increased by £2,000,000 in 5s. ordinary shares, beyond the registered capital of £7,000,000.

EVA BROS., LIMITED, forgemakers, etc., of Manchester, increased by £149,900 in £1 ordinary shares, beyond the registered capital of £100.

R. HEMMINGFIELD, LIMITED, ironfounders, etc., of Middlesbrough, increased by £4,000 in £1 ordinary shares, beyond the registered capital of £2,000.

THYSSEN SHAFT SINKING COMPANY, LIMITED, London, S.W.1, increased by £50,000 in £1 ordinary shares, beyond the registered capital of £100,000.

S. CROWTHER (ROYTON), LIMITED, ironmasters, etc., of London, E.C.2, increased by £20,000 in £1 ordinary shares, beyond the registered capital of £10,000.

STREBOR DIECASTING COMPANY, LIMITED, Radcliffe (Lancs), increased by £190,000 in 5s. ordinary shares, beyond the registered capital of £60,000.

HARRISON (BIRMINGHAM), LIMITED, brassfounders, etc., increased by £604,000 in 5s. ordinary shares, beyond the registered capital of £546,000.

FRY'S (LONDON), LIMITED, engineers, etc., of Crawley (Sussex), increased by £48,000 in 2s. ordinary shares, beyond the registered capital of £100,000.

HENNAN GROUP, LIMITED, engineers, etc., of Shrub Hill (Worcs), increased by £800,000 in 5s. ordinary shares, beyond the registered capital of £1,600,000

W. D. CARROLL, LIMITED, manufacturers of forgings, etc., of London, S.W.6, increased by £7,500 in £1 ordinary shares beyond the registered capital of £7,500.

CRADLEY HEATH MANUFACTURING COMPANY, LIMITED, tube manufacturers, etc., increased by £100 in £1 ordinary shares, beyond the registered capital of £10,000.

KELHAM ISLAND STEEL WORKS, LIMITED, Sheffield, increased by £45,000 in 3,600 preference and 41,400 ordinary shares of £1, beyond the registered capital of £5,000.

BARWORTH HOLDINGS, LIMITED (formerly Barworth Steel Works, Limited), Sheffield, 3, increased by £95,000 in £1 shares, beyond the registered capital of £5,000.

CROWN FITTINGS (WALSALL), LIMITED, ironfounders and masters, etc., of Walsall, increased by £5,000 in £1 ordinary shares, beyond the registered capital of £2,500.

W. TYZACK SONS & TURNER, LIMITED, manufacturers of files, saws, etc., of Sheffield, increased by £50,000 in 5s. ordinary shares, beyond the registered capital of £200,000.

SPENCER WIRE COMPANY (NON-FERROUS), LIMITED, London, S.E.19, increased by £225,000 in £1 2nd non-cumulative preference shares, beyond the registered capital of £25,000.

J. T. MEREDITH & COMPANY, LIMITED, general ironworks engineers, etc., of London, S.E.1, increased by £15,000 in £1 "C" shares, beyond the registered capital of £38,000.

W. N. BAINES & COMPANY, LIMITED, engineers, brassfounders etc., of Rotherham (Yorks), increased by £70,000 in £1 ordinary shares, beyond the registered capital of £30,000.

WOODHOUSE & RIXSON, LIMITED, steelforging and bent crank manufacturers, of Sheffield, increased by £300,000 in 2s. 6d. ordinary shares, beyond the registered capital of £200,000.

Visit by EFTA Journalists

THIRTEEN journalists representing leading newspapers from member countries of the European Free Trade Association are to visit this country next week as the guests of the British Iron and Steel Federation. The group will not only visit steelworks, but also have the opportunity of seeing other important industries and meeting industrialists. Members of Parliament, and some of their journalistic colleagues in this country. The tour will end in London on May 1 with a dinner given by the president of the Federation, Mr. C. R. Wheeler.

A spokesman for BISF said that the visit had been arranged because the British steel industry is anxious to encourage the closest possible exchanges between member countries of the association.

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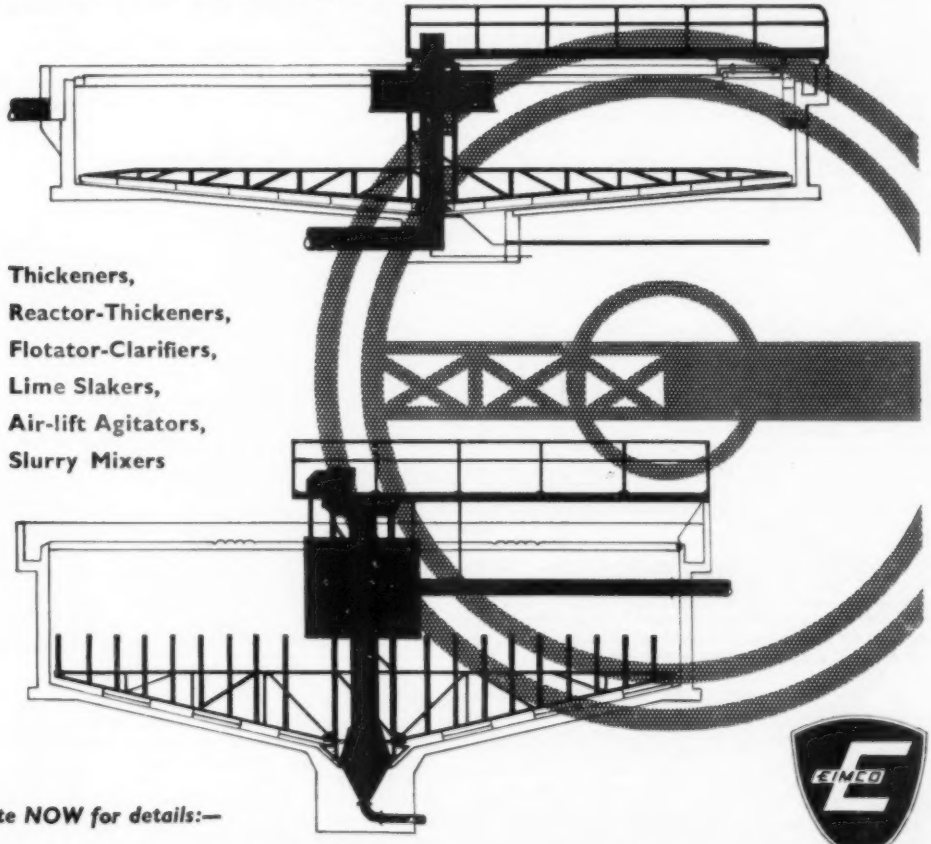

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NEWS IN BRIEF

PRESIDENT OF Italy's State-controlled ENI-AGIP Oil Corporation, Signor Mattei, announced last week that big new deposits of natural gas had been discovered in the Abruzzo region, east of Rome, and in Sicily.

THE INDIAN GOVERNMENT has announced restrictions over the coming six months on the import into India of a number of industrial products, including iron and steel pipes. The move has been made to save on foreign currency, it is stated.

RELINING OF No. 2 blast furnace at Consett Iron Company, Limited, Consett (Co. Durham), is to be carried out by Tattersall & Sons, Limited, Middlesbrough. The relining will take about 40 days and 500,000 bricks will be used.

SAID TO BE the biggest bucket in the world—it weighs 28 tons and 60 people can stand in it—left Sheffield on Monday for Glamorgan. It was made at the East Hecla works of Hadfields, Limited, for a dragline and will be on the road for a week.

LICENCE AGREEMENT has been concluded by the Plessey Company, Limited, instrument and electronic equipment manufacturers, of Ilford (Essex), and Guldner-Motorenwerke, a member of the Linde group of companies, in Germany to manufacture Hydro-Stabil equipment for sale in the UK and the Commonwealth.

AGREEMENT HAS BEEN REACHED between Moxey, Limited, engineers of West Bromwich, and Laeis-Werke, Trier, Germany, to co-operate in the building of plant for the production of dolomite bricks for lining oxygen blown steelmaking furnaces. Contracts for such plants have been recently placed by Richard Thomas & Baldwins, Limited, and the Consett Iron Company, Limited.

IDEAL CASEMENTS (EAST AFRICA), LIMITED, is reported from Nairobi by Barclays Bank DCO to be setting up Kenya's first rolling mill. The mill, of British make, will roll imported British steel and will consume about 2,000 tons per annum when in full production. It is planned to produce tools such as hoes, forks, etc., for the indigenous agricultural population.

WITH HEADQUARTERS in Como, F. Perkins, Limited, has formed a new company in Italy, called Perkins, SpA. The new company's duties will include improving technical and field services to the many users of Perkins diesel engines in Italy and further expanding sales to manufacturers requiring economical diesel units in the agricultural, automotive, industrial, and marine fields.

PARTY OF 35 members of the National Association of Non-Ferrous Scrap Metal Merchants last week visited the Birmingham works of the Delta Metal Company, Limited, and three other companies within the Delta group. Among the party was the president, Mr. H. G. Shields, and the vice-president, Mr. A. G. Robinson. They were received on behalf of Delta by Mr. E. Cashmore, group buyer.

ONE OF THE LONGEST above-ground conveyor belts in the country has been made from a four-ply Terylene cotton fabric by Barrow Hepburn & Gale, Limited, London, S.E.1, for the Midland Gravel Company, Limited. The 24-in. wide belt is over 2,000 ft. in length. When it was decided to change over to the new fabric the whole conveyor was redesigned by the Mining Engineering Company, Limited, Worcester.

REPORT BY THE American Iron and Steel Institute states that steel output in the week ended April 15 was the highest in 10 months. Production was 1,748,000 tons compared with 1,696,000 tons in the previous week. Last week's output was the highest since the 1,775,000 tons produced in the week ended June 18, 1960. Production for the year to date is 23,402,000 tons, against 39,292,000 tons a year earlier.

LESS THAN 24 hours after Mr. Reginald Maudling, president of the Board of Trade, last week announced the Export Guarantee Department's "small exporter policy," specially tailored to the needs of manufacturers with annual export turnover below £10,000, a Sheffield edge-tool manufacturer had completed details for the new cover. He requires the cover initially on an order for £80 cash against documents from Australia.

MILL HOUSING weighing 180 tons was delivered on Monday to the Birmingham works of James Booth Aluminium, Limited, after a four-day 90-mile journey from the Liverpool works of the English Electric Company, Limited. It is the first of two housings for the company's new aluminium rolling mill—the largest of its type in Western Europe—and was transported on the largest trailer in the world, a 200-ton 32-wheeler, built by Cranes (Dereham), Limited.

A ONE-DAY CONFERENCE on "Profitable Uses of Capital" is being organized by the British Institute of Management in London on May 30. Among those contributing papers will be Mr. F. J. Young, financial director and secretary, the Steel Company of Wales, Limited, and Mr. A. T. Oram, the British Oxygen Company, Limited. Sir Joseph Latham, financial director of Associated Electrical Industries, Limited, and former deputy chairman of the National Coal Board will preside.

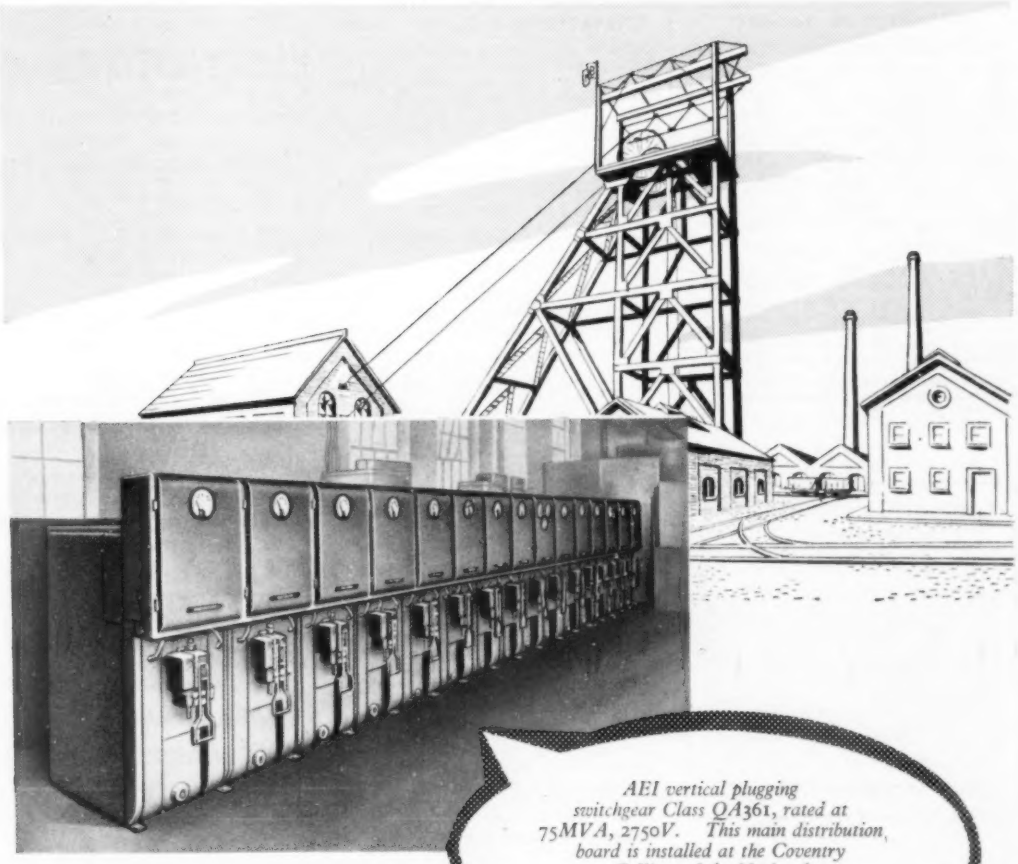
NEW COMPANY has been formed in India by the Skefco Ball Bearing Company, Limited, Luton. Known as the Associated Bearing Company, Limited, it will manufacture ball and taper roller bearings and other accessories for the automobile and textile manufacturing industries. The plant will be at Poona and it is planned to begin production at the end of 1962. Other shareholders in the company are Akteiebolaget Svenska Kullagerfabriken (SKF, Gothenburg), and the Investment Corporation of India, Limited.

New £500,000 Rolling Mill for Wolverhampton

AT a cost of more than £500,000, a new 14-in. merchant bar and section mill is to be installed at the Osier Bed Works of Wolverhampton & Birchley Rolling Mills, Limited, a member of the Thos. W. Ward, Limited, group of companies. Orders for the new plant have been placed with Brightside Foundry & Engineering Company, Limited, Sheffield, and the rolling mill and its equipment will cost over £300,000.

The structural steelwork department of Thos. W. Ward will erect the buildings for the new mill and five overhead electric cranes will be supplied and installed by John Smith (Keighley), Limited, another member of the Ward group. In about two and a half years' time, when the scheme is complete, the productive capacity of the company will increase to approximately 150,000 tons of steel bars and sections a year.

AEI ELECTRIC MINING EQUIPMENT *speeds production*



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Above or below ground, AEI electric mining equipment—flameproof where required—provides power for the men employed in an essential industry.

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SITUATIONS VACANT

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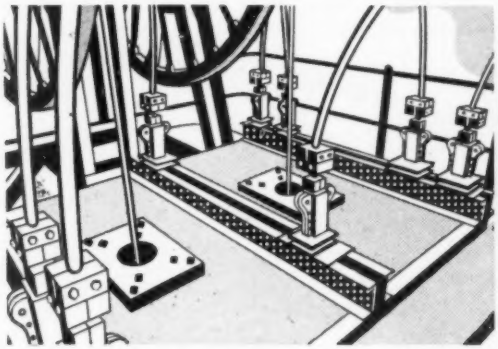

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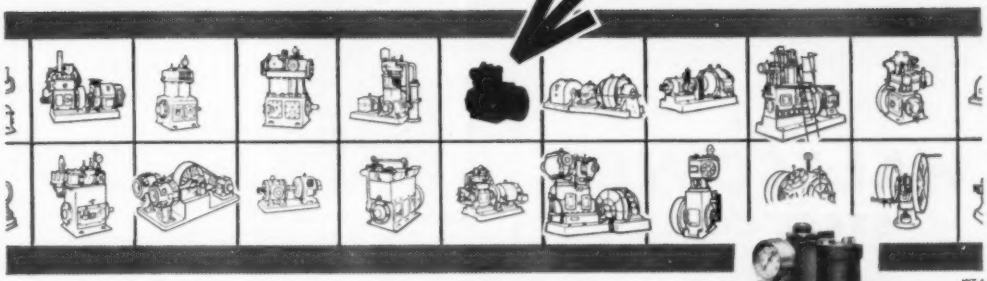

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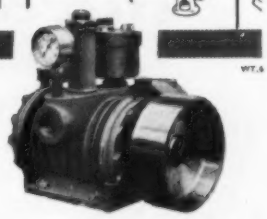

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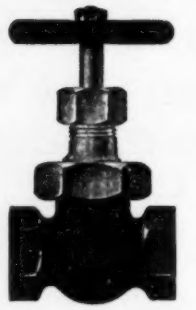

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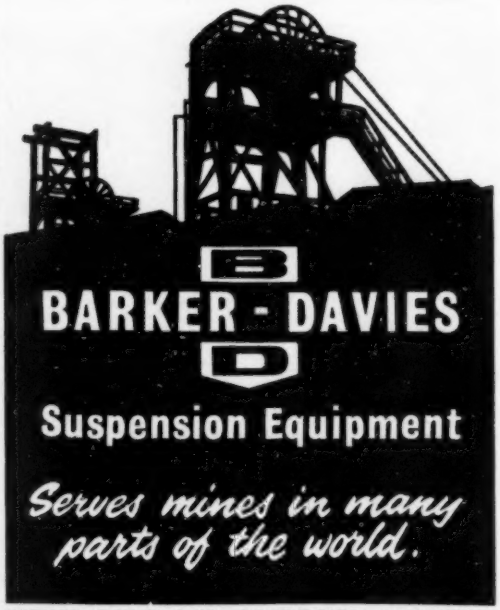

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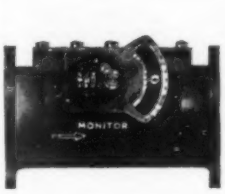
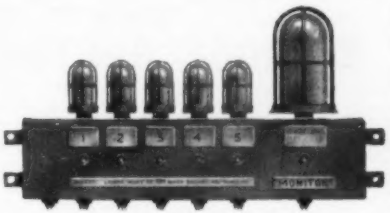


Fig. 1.

Fig. 2.

Fig 3.



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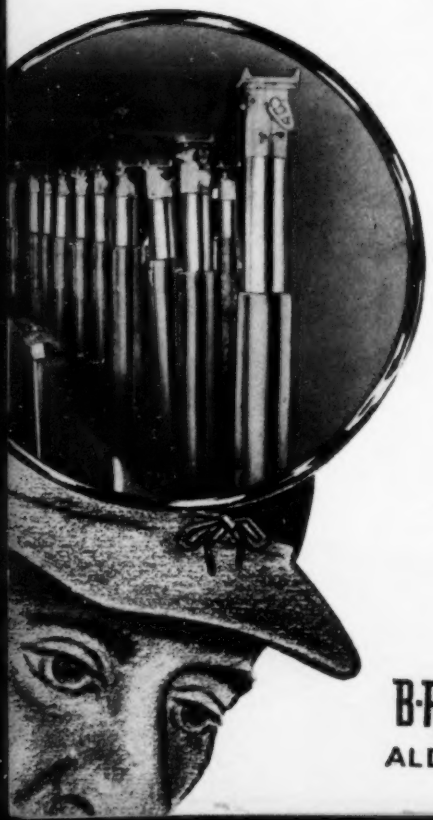

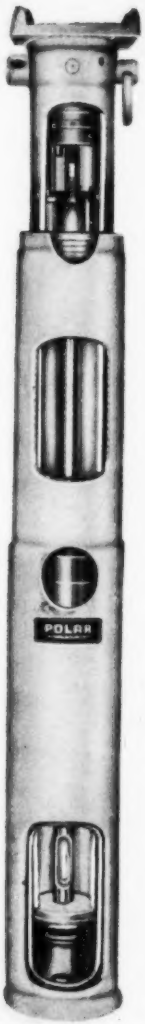

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